A Database Publication

THE MICRO USER

Volume 4
Number 2
April 1986
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The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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Read all about it on Page 142.

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BUSINESS MICRO USER

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SOLIDISK MEMORY UPGRADES

Solidisk offers the most extensive and economical choice of memory upgrades for the BBC B on the market today. Free installation of these as with all Solidisk products is available from our 90 strong team of Local Experts.

External ROM Cartridge

Starting from the bottom of the range is a simple External ROM Cartridge Adaptor, which plugs into any ROM socket and will accept Solidisk or Acorn ROM cartridges (as used on the Electron and the new Master). These may easily be inserted or removed without opening the computer case or fear of damage to the ROMs.

Fourmeg tm CPU and ROM expansion

In the ordinary BBC computer, the processor (CPU runs at 2 Mega-Hertz. By adding faster memory and increasing the speed to 4 MHz, we have enabled the BBC to run most programs in half the time. The Fourmeg plugs into the 6502 processor socket, and the additional connections are made by sprung clips and plugs.

The board also provides four high capacity ROM sockets, as used in the BBC B Plus and the Master machine. Up to 160K of ROM software can be fitted on this board (one 64K and three 32K ROMs). The new 4MHz processor is equivalent to that used on the Master and the Acorn TURBO board. It will run most Master software such as Acorn's new BASIC4 and at twice the speed of the ordinary Master.

A switch reverts the 4MHz speed to normal.

The higher speed is available to all ROMs installed in the Fourmeg board and programs in the onboard RAM. The rest of the machine (ROM, RAM, tape, disc, timers and add-ons) is unaffected.

Fourmeg and ROM expansion with 32K RAM

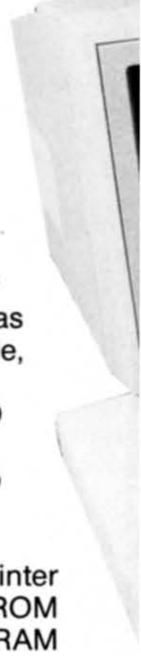
The next step in expansion is the Fourmeg board with 32K of RAM. This board can be used exactly as above, with the added advantage of Shadow RAM and Sideways RAM, as on the BBC B Plus. In Shadow mode, an enormous 27K of free RAM is available, even when using MODE O and disc. In non Shadow mode, the expansion RAM can be used as two Sideways RAM banks. These can contain the image of two Sideways ROMs or be used as RAMDISK or printer buffer. As well as the four on board ROM sockets, the Shadow and Sideways RAM can run at full 4MHz speed.

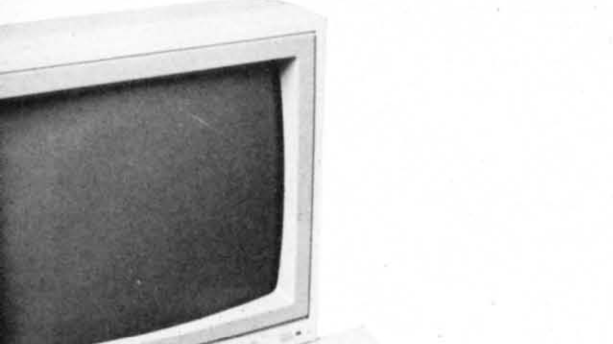
32K, 64K and 128K Sideways RAMs

The most popular and well established range of Sideways RAM comprises 32K, 64K and 128K boards. You can start with 32K and upgrade later even to the 256K. The 64 and 128K RAM boards have two high capacity ROM sockets as on the B Plus.

Sideways RAMs are compatible with all issues of BBC B with most add-ons except ROM boards. Sideways RAM can run all types of software that is normally available in ROM. Solidisk has a large library of programs covering many applications. These include Wordprocessor, Database, Spreadsheet, Spelling Checker, Basic, Sprites, Ramdisc, Machine Code Monitor, Digitised Pictures, Teletext Editor, a large number of games, Disc Filing System with Page at EOO etc. and available in packs of five discs, in 40 or 80 track format.

Software pack 1 (volumes 1 to 5) is included with all Sideways RAM boards. Software pack 2 (volumes 6 to 10) and the new software pack 3 (volumes 11 to 15) may be ordered separately.





The Solidisk 256K Board

Finally, the largest in memory upgrades is the 256K board. This has 256K of RAM, four high capacity ROM sockets and a Fourmeg processor, WORDWISE PLUS ROM — the best selling wordprocessor from Computer Concepts, and the Solidisk 32K Manager ROM.

The 256K RAM can be used as Shadow RAM, Sideways RAM, RAMDISK, or all three at once.

In this board, each of eight sideways RAM banks can be 16K or 31K to increase to amount of code. Software which occupied two ROM slots in a standard machine may now be rewritten into a single ROM slot, thus becoming shorter in size and faster in operation. If need be, each bank can be split between Shadow and Sideways RAM, the border being controlled by the application software.

The Manager ROM, supplied with this board, contains Solidisk Programming Toolkit, VDU recorder, printer buffer and RAMDISK.

Real Time CLock and Solidesk

The Real Time Clock (RTC) is battery powered, giving accurate time and date. The "SOLIDESK" ROM uses the 50 bytes of battery backed RAM in the RTC chip to custom-configure the BBC computer on start-up as in the new Master machine.

The RTC board is plugged into the Analogue to Digital Converter (ADC, NEC-7002) socket, the latter moved into an empty socket on the board.

⋆TIME prints the date and time, ⋆TIME <date><time> sets the new time. ⋆CONFIGURE<parm><option> sets the start-up option for one of the 20 parameters such as TUBE, Language, Filing System, Boot, Modem, screen mode etc. 20 spare bytes can be used by application software.

⋆DESK presents a friendly ICON/MOUSE environment. An AMX Mouse or Marconi tracker ball is preferred as input device but the keyboard may also be used. With DESK, you can display the disc catalogue, select programs, set alarm for your appointments (that is one of the things the RTC is good at!), use the calculator or write BASIC program. Available soon.

Prices, inclusive of VAT

External ROM cartridge adaptor	£15.00
Basic Fourmeg board	£30.00
Fourmeg board with 32k RAM	£69.00
Sideways RAM 32k with software pack 1	£50.00
Sideways RAM 64k with software pack 1	£80.00
Sideways RAM 128k with software pack 1	£125.00
256K board with WW Plus and Manager ROM	£175.00
Real Time Clock and SOLIDESK ROM	£29.00

Solidisk Technology Ltd 17 Sweyne Avenue, Southend SS2 6JQ

SOLIDISK DISC INTERFACES

Solidisk offers well designed Disc Interfaces enabling your computer to use floppy disc drives. If you feel you would have any difficulty in installing it and/or adding disc drives, you can contact one of our 90+ Local Experts who will install it for you free of charge.

The 1770 Disc Interface

The Solidisk 1770 Double Density Disc Interface has only four components and can easily be fitted even by a novice. The 1770 Disc Interface is supplied with Solidisk 2.2 DFS ROM.

The Solidisk 1770+8271 Disc Interface

If you already have an 8271 Disc Interface, then the Solidisk 1770+8271 Interface will give you the best of both worlds. You can select either the 8271 or the 1770 at the flick of a switch. The 1770+8271 Interface is supplied with Solidisk Advanced Disc Filing System (ADFS). This is a 32K ROM set, available in two 16K or one 32K ROM and contains both DFS and ADFS.

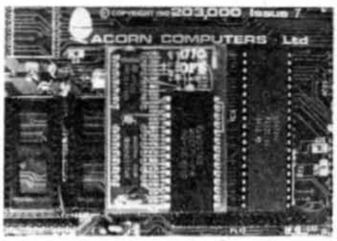
Features built into ROM	DFS 2.2	ADFS
Disc formatter	yes	yes
Disc verifier	yes	yes
Memory editor	yes	yes
Disc sector editor	yes	yes
Disc copier	yes	yes
Recover & Restore	yes	yes
Read track & Write track	yes	yes
Run 8271 floppy disc controller	yes	no
Osword 7F emulator for 1770	yes	yes
Tape to disc	yes	yes
Download	yes	yes
DFS files to ADFS	no	yes
ADFS files to DFS	no	yes
40/80 switching for 80-track drives	yes	only in DFS
Solidisk Winchester	no	yes
6502, Z80 and 32016 compatible	yes	yes
Read & Write IBM-PC DOS discs	yes	yes

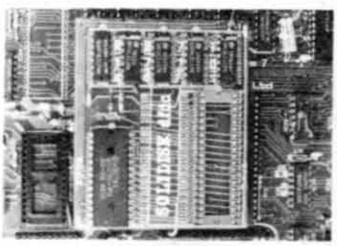
Both the DFS and ADFS have every facility that you would expect. They can run most protected software, such as Elite, Castle Quest, Island Logic's Music System etc. Other features include read after write, and the option of double density operation (with the 1770 chip) giving 60% extra storage capacity. Their compatibility with all Acorn Second Processors (6502, Z80 and 32016) and Econet File Server (Level 2), and their capability of reading from and writing to IBM-PC DOS diskettes (with the 1770 chip) reflect the broad range of applications supported. Both 1770 and 1770+8271 Disc Interfaces are compatible with Acorn 1770 DNFS and ADFS ROMs.

The DFS and ADFS ROMs can be used to enhance both standard Acorn 8271 or 1770 Disc Interfaces, on the BBC Model B or the B Plus.

Prices, inclusive of VAT

2.0 DFS ROM and manual	£10.00
ADFS+DFS ROM set and manual	£20.00
Upgrade from 2.0 DFS to ADFS	£10.00
1770 Disc Interface, 2.0 DFS ROM and manual	£45.00
1770 Disc Interface, ADFS, DFS ROMs and manual	£55.00
1770+8271 Disc Interface, 2.0 DFS ROM and manual	£50.00
1770+8271 Disc Interface, ADFS, DFS ROMs and manual	£60.00





The Solidisk Floppy Disc Drives

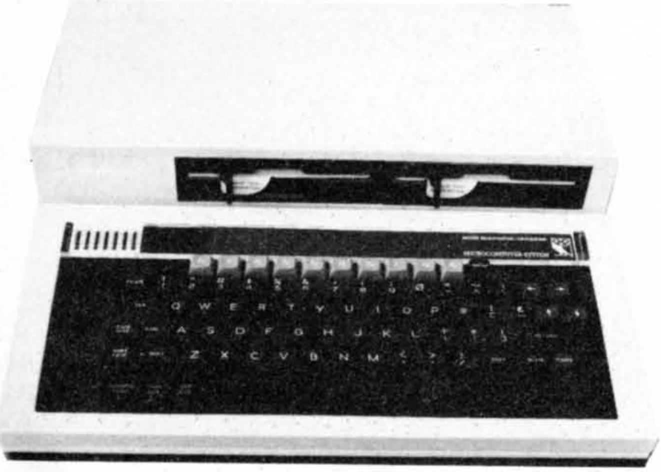
Solidisk floppy disk drives are 80-track, double-sided, 5¼ inch with capacity of one Megabyte unformatted (640K formatted with Solidisk double density DFS or ADFS). They are enclosed in strong steel casings to protect the mechanism. The power and data leads are included. The disc drives, made by NEC or Mitsubishi, are Beeb-powered.

With the disc drive, Solidisk provide five volumes of useful software, each on a separate diskette and with appropriate user manuals.

The CPU and Keyboard

Case

This compact steel case is designed to hold a BBC and two Solidisk floppy disc drives. It will support even a heavy weight monitor, while providing good cooling for the power supply and concealing many connecting cables. The keyboard is housed in a separate case, connected by a 24 inch lead.



The Wordprocessing Package

The wordprocessing package comprises of 160cps printer, an 80-track double-sided disc drive, five software diskettes, Wordwise Plus ROM, one blank disc, 100 sheets of printer paper, all leads and manuals. In fact, everything you need to start wordprocessing right away. This package is for the new Master machines and the BBC B fitted with Acorn or Solidisk DFS.

The printer is a 9 needle dot-matrix, with a speed of 160cps draft and 32cps NLQ mode. It features multiple pitch settings, italics, boldface, underline, super and subscripts, bit image graphics etc. It uses the same ribbon and control codes as the Epson FX85.

The disc drive is a top quality 5¼ inch drive of either Mitsubishi or NEC manufacture.

Wordwise Plus is Computer Concepts' best selling Wordprocessing ROM combining all features of an excellent wordprocessor with the flexibility of its built-in programming language.

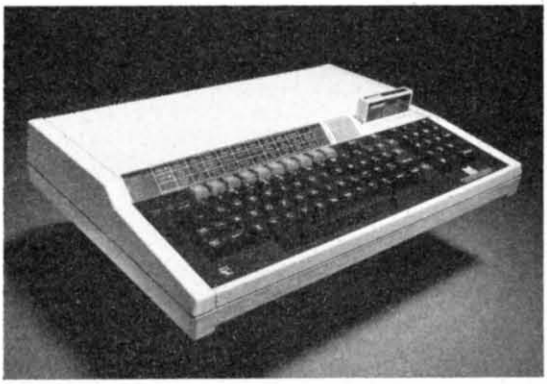
The supplemental software includes Spelling Checker, Database, Spreadsheet and games so this package is not limited just to wordprocessing.

This package can be the centre of a more substantial computer system. For instance, if there are more users, an Econet network can be cheaply built-up, sharing software, printer, disc storage and even Winchester. The cost per user will then decrease dramatically.

BBC Master
Special Package Offers Available

1) 128K BBC Master,
   with Wordprocessing package £750
2) Business Pack: complete 3 operating 128K Master keyboards, Econet, 160cps printer, 20MB Winchester, 1 floppy drive, Wordprocessor, database, spreadsheet, all leads and manuals. Call for demo.
   Ideal for small offices £2399.00

All prices include VAT, delivery extra.



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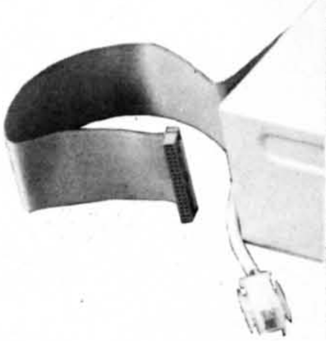
SOLIDISK WINCHESTER FOR SINGLE AND NETWORK USERS



The Solidisk Winchesters provide highly efficient storage for BBC computers — at present the Model B and B Plus, and Acorn Second Processors — and soon the new Master Series.

The Winchesters are supplied with both the Solidisk Disc Filing System (DFS) and Advanced Disc Filing System (ADFS) in ROMs. These are fast and reliable, and have full facilities to move files between them.

The Solidisk DFS can use floppy discs in single or double density. Moreover, it can read from, and write to (IBM) PC-DOS and MS-DOS discs (but not format them or add entries to their directories). It also has a good 8271 emulator to run most protected disc software — both games and business — from Acornsoft, Alligata, Beebug, Clares, Island Logic, Micro Power, Superior Software etc.

It is intended for use with one or two floppy disc drives, and allows an unlimited number of filenames, rather than the standard 31. However, it is still limited to a file length of 256K and a maximum of 5 files open at once. Hence the DFS is inadequate for database and accounting applications — for which the ADFS is ideal. Moreover, the catalogue is single level.

Winchesters for single users

The Solidisk ADFS can handle one or two Winchester drives plus one or two floppy disc drives. Files on any drive can be up to 512 Megabytes (or the drive size limit) in length. Up to 10 files can be open at the same time, and essentially unlimited numbers can be organised in a multi-level catalogue. The ADFS is also much faster acting, and files can grow in place without risk of 'Can't extend'.

Operating systems such as CP/M (Z80) and Panos (32016) can use either the DFS, to control only floppy disc drives, or ADFS, to control both these and Winchesters. Furthermore, the ADFS allows the Winchester to be "partitioned" into multiple user areas, accessed by CP/M, Panos etc., as well as the normal ADFS. The powerful Acorn 32016 comes with the "Install" program which will move Panos from the system floppy disc to the Winchester. Panos is first started under the Solidisk DFS or Acorn DNFS, then Install is run. Thereafter, Panos can be booted from the Winchester. Moving files between the floppy discs (DFS format) to the Winchester (ADFS format) is done by the Panos COPY command.

The Acorn Z80 Second Processor as supplied will only allow BBC Basic (Z80) to take advantage of the ADFS, and hence the Winchester. To run CP/M, a new BIOS ROM is required.

Winchesters for small networks

The existing Net Filing System (NFS) lacks local buffering. For example, each byte transmitted using BGET or BPUT requires four "frames" (or packets).

Solidisk will soon introduce the Net-Disc Filing System (NDFS). This, although using the standard Econet hardware, implements a direct link between any work station and the Winchester disc drive on station 254. No dedicated file server machine (nor any Second Processor to run the File Server software) is needed. In addition, the NDFS allows up to 10 channels to be open, and files to be transmitted in blocks of 256 bytes, rather than character by character.

This NDFS is also suitable to network 32016 and Z80 Second Processors.

The cost saving is substantial, especially for small networks. For example, four workstations sharing one Winchester via such a network is cheaper than four stand-alone machines equipped with local floppy disc drives. In business, sharing and transferring files over a network is much more practical than swapping floppy discs between machines.

Winchesters for level 2 file servers

A sizeable proportion of BBC software runs only under the DFS. Solidisk has therefore developed the Winchester Disc Filing System (WDFS), to emulate multiple floppy disc drives on a Winchester. The latter is normally controlled by the ADFS, but for the WDFS, a "partition" is initially created in the root directory. This contains up to 100 "virtual drives", each of 200K, for use only by the WDFS. Like the real floppy drives, they can be given any number from 0 to 99.

The Solidisk WDFS enables the Econet Level 2 File Server to use Winchesters, which dramatically improves both speed and capacity.

The Winchester is very fast acting, and data written to the Winchester benefits from the in-built "Read after Write" for improved reliability.

To use the Solidisk Winchester with the Level 2 File Server, the Solidisk ADFS and WDFS ROMs are simply fitted to the right of the Acorn DNFS ROM in the file server machine, and the Winchester plugged into the 1MHz bus connector. The WDFS will work with either the 8271 or the 1770 Disc Interfaces.

THE SOLIDISK WINCHESTER RANGE

It is easy enough to compare specifications and prices of Winchester drives, but there is more to it than that. Solidisk has a policy of continuous development, which is reflected in the broad range of applications supported. This, in turn, ensures the maximum return for your investment.

The Solidisk Winchesters are available in the following packages:

1)	**10 Megabytes,** 5.25ins, Beeb powered	£499.00
2)	**10 Megabytes,** 5.25ins, mains powered	£569.00
3)	**20 Megabytes,** 5.25ins, Beeb powered	£661.25
4)	**20 Megabytes,** 5.25ins, mains powered	£747.50
5)	**20 Megabytes,** 3.50ins, Beeb powered	£720.00
6)	**40 Megabytes,** 3.50ins, mains powered	£1148.85
	Delivery by courier	£10.00

All prices include VAT.

The packages include:

- The Winchester drive itself.
- DFS (or WDFS on request) and ADFS ROMs.
- One utility diskette in 5.25 inch, 160 track, ADFS format.
- Manuals for both ROMs and diskette.
- One year guarantee.

5.25 inch Winchesters

These drives (of 10 or 20 Megabytes formatted) are of established design, low noise, low power consumption, and have the same "form factor" as a half-height floppy drive. They can be fitted into the Solidisk CPU case in place of a floppy drive if required.

3.5 inch Winchesters

These are of the latest technology, featuring even lower noise and power consumption in an even smaller package. The drives have the same form factor as a 3.5 inch half-height floppy drive and a smaller footprint than the "User Guide"!

Beeb powered or mains powered

The Beeb powered Winchesters are only suitable for use with machines fitted with the shiny, switched mode power supply. The power lead will also support a single floppy disc drive.

If the machine is already supporting twin floppy disc drives, or many add-ons, a mains powered Winchester should be specified.

TWO KEY ADVANTAGES of Winchesters over floppy discs are higher capacity and faster transfer rate.

Unlike floppy disc drives, Winchester drives are enclosed in sealed casings, allowing very high track density, up to 600 compared with 40 or 80.

Their discs are non-removable, rotating continuously at high speed (3600rpm), enabling data to be transferred 20 times faster than single density floppy discs.

The Solidisk Winchester drives have a further advantage over some competitors. They have "buffered seek", hence stepping pulses can be as short as 2 microseconds. This results in an average access time of 80 milliseconds — less than one tenth of some other drives.

This is specially important as the Winchester fills up.

Hardware requirements

To use a Solidisk Winchester, you will need either a BBC Plus, or a BBC Model B, fitted with a 1770 disc interface (Acorn or Solidisk). If you already have the 8271 Disc Interface in your machine, we recommend replacing it with the Solidisk 8271 + 1770 disc interface rather than just the 1770 disc interface. The Winchester drive is connected to the 1MHz bus socket.

The Linemaster ROM

The Solidisk Linemaster ROM allows the BBC micro to communicate with other computers. In addition to the standard Terminal and Prestel modes, it has Viewdata Host Mode and the ability to autodial and autoanswer, all controlled by software.

Telecom Gold

Telecom Gold is the British Telecom electronic Mail Service enabling computer users to send and receive messages, telexes and to access many large databases. The Linemaster ROM allows you to use the BBC computer to communicate with Telecom Gold and Bulletin Boards. Its features include various baud rates and protocols, an elapsed time clock and 40/80 column screen display.

Prestel

Prestel i the British Telecom Viewdata service. The Linemaster ROM offers extensive facilities to communicate with Prestel. If you have an autodialling Modem, a simple command such as ★PRESTEL 618 (for London) can put you "online" with the local Prestel computer.

Viewdata Host

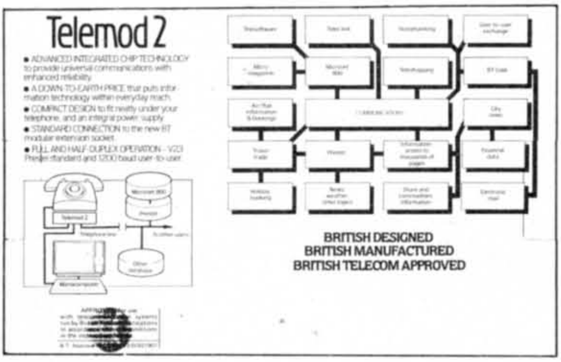
In this mode, your BBC is set up as 'Prestel look alike'. Other users can communicate with your computer exactly as with Prestel. They can browse through pages that you create using Linemaster.

Modems

The Linemaster ROM works well with all RS423 type modems, eg Telemod, Nightingale, Miracle etc. but not all modems support all the features of the Linemaster.

Telemod 2 Modem

The Telemod 2 is a high quality, mains powered, BABT approved MODEM for direct connect. This means that there are no rubber cups to fit the telephone into, but just a connection to a modern socket, with the telephone plugging into the back of the modem. The modem supports 1200/75 baud (V23) communications protocol as in Prestel and Telecom Gold.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ORDER BY MAIL: Please complete the coupon opposite (or a copy) and send it to:

Solidisk Technology Ltd 17 Sweyne Avenue, Southend SS2 6JQ

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Qty		Price	P&P
....	External ROM cartridge adaptor	15.00	1.00
....	Basic Fourmeg Board	30.00	1.00
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....	Sideways RAM 64K with software pack 1	80.00	1.00
....	Sideways RAM 128K with software pack 1	125.00	1.00
....	256K Board with WW+ and Manager ROM	175.00	1.00
....	Real Time Clock and SOLIDESK ROM	29.00	1.00

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....	1770 Upgrade with 2.2 DFS ROM	45.00	1.00
....	1770 + 8271 Upgrade 2.1 DFS ROM	60.00	1.00
....	ADFS + DFS ROM set	20.00	1.00
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....	Solidisk 80 track double sided drive	109.00	3.00
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....	Wordprocessor for the B+ or Master	309.35	10.00
....	Wordprocessor with 1770 DFS & 2 drives	458.85	10.00

Winchesters

....	10 MB 5¼in. Beeb powered	499.00	10.00
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....	20 Mb 5¼in. Beeb powered	661.25	10.00
....	20 Mb 5¼in. mains powered	747.50	10.00
....	20 Mb 3½in. Beeb powered	720.00	10.00
....	40 Mb 3½in. mains powered	1148.85	10.00

Modems

....	Linemaster ROM and manual	10.00	1.00
....	Telemod 1 MODEM (BABT approved) with Linemaster ROM	50.00	3.00
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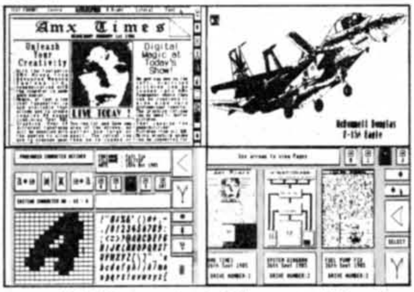
When the press use such words as 'Phenomenal', 'Outstanding', 'Ideal' and 'Worth Every Penny', they've obviously discovered something rather special.

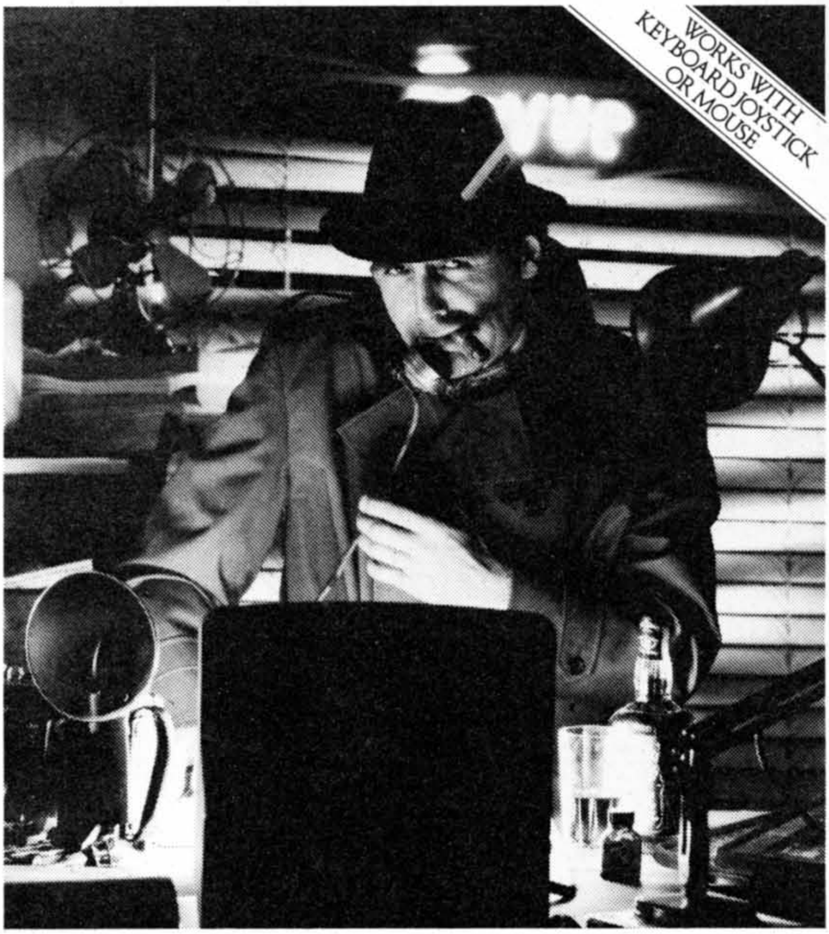
But when that something turns out to be a product in which they are already expert, then it must be something very special indeed. The object of their enthusiasm is AMX Pagemaker – a revolutionary software program that will produce newspapers, posters, leaflets, notices and hand-outs – in fact anything where text and graphics are required, to an extraordinary professional standard.

It's a complete graphics design system and word processor rolled into one.

AMX Pagemaker consists of two Roms and two discs therefore it will work on a standard BBC or B+ micro without a Rom board.



AMX Pagemaker is fully compatible with either the AMX Mouse – joystick or keyboard and requires the minimum of a single 40 track disc drive. It has real time graphics with fast continuous scrolling up and down an A4 page and uses Mode 0, the highest graphics resolution on the BBC.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You can type directly on to the screen, with any of the 16 typefaces supplied or design your own, alternatively, you can load in wordwise and view files with fully automatic on screen text formating as they load. Either way centering, ragged right and literal justification are all available. There is full pixel resolution control over character size and spacing: Also included is a Micro justification facility.

EXTRA, EXTRA.

There are outstanding facilities for drawing, spraying and painting, using either the patterns supplied, or your own pattern designs, enabling you to achieve some incredible graphic results. A complete Mode conversion program is included allowing you to load in drawings and digitised pictures from all BBC graphic modes. The cut and paste facilities include: copying, moving, rotating, stretching and a fantastic zoom is also available.

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AMX Pagemaker is your opportunity to join the publishing revolution, it comes complete with a comprehensive manual which the press describes as 'Superb'.

At only £49.95 the cost of the Pagemaker is as amazing as the program itself.

Let's leave the last word to the press.

*"Pagemaker" is phenomenal – it lends itself to creating anything where text and graphics are involved – notices, posters, leaflets, hand-outs, newsheets. Packages like this have been the province of the 16 – bit micros until now, this product is worth every penny of £49.95."

* 'Educational Computing', January 1986.

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AMX Mouse is compatible with all six modules of **Mini Office II**
Word Processor • Database • Spreadsheet
Graphics • Communications • Label Printer

When we introduced our AMX Mouse to BBC Micro users, the response was phenomenal.

And no wonder!

It was regarded as 'pushing the BBC to its limits' and hailed by the press as 'probably the best input device that has appeared recently'. The AMX Mouse brought to BBC Micro users the same sophisticated, positive control that had, until then, been the province of the more expensive computers, like the Macintosh.

Now we announce a new enhanced software package which, can be used with a traditional keyboard or joystick but truly comes into its own when used with the AMX Mouse.

AMX Super ROM and Super Art adds colour to the features of the original AMX ROM, on a new 16K ROM.

It dramatically extends the original AMX ROM facilities to include Pull Down Menus, over lapping colour windows, colour patterns and an extended Icon set in all graphic modes.

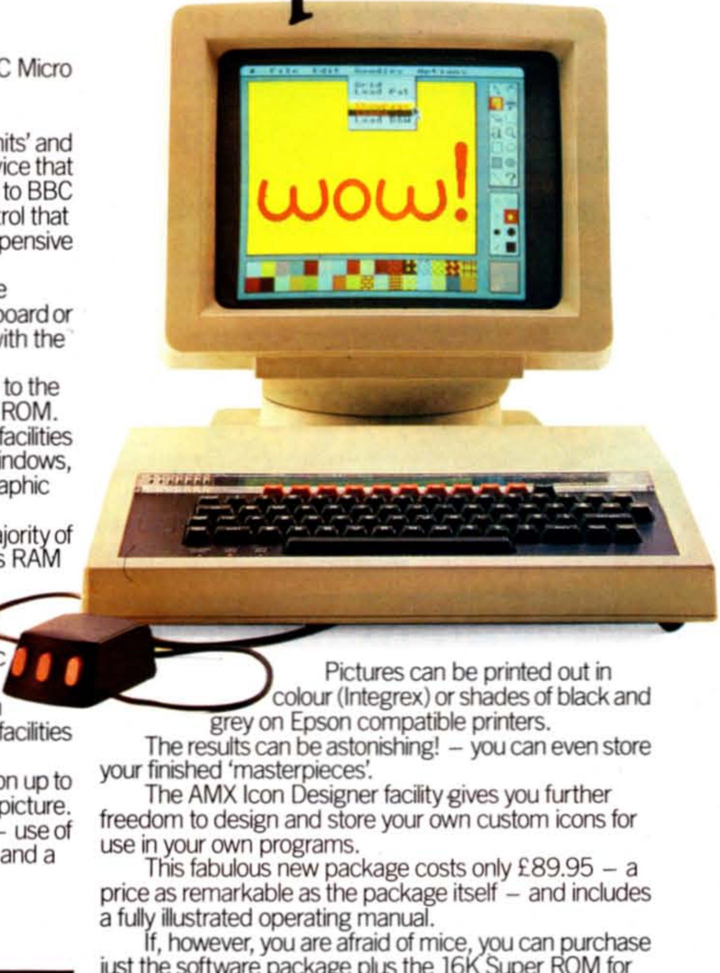
Specially written to be usable with the vast majority of BBC Systems including 2nd processors, the Aries RAM Board, the BBC + Shadow mode, tape, DFS and ADFS.

The kernel of the Super Art program is included in the 16K ROM, providing tape and disc users with a Mode 1 colour drawing program.

But Super Art really comes into its own when used on a disc based system; a host of additional facilities can be selected direct from the screen.

Colour pictures can be created in dot resolution up to A4 size by scrolling the screen window, over the picture.

Other facilities include colour pattern editing – use of icons, additional text styles, various copy facilities and a superb colour Zoom.



Pictures can be printed out in colour (Integrex) or shades of black and grey on Epson compatible printers.

The results can be astonishing! – you can even store your finished 'masterpieces'.

The AMX Icon Designer facility gives you further freedom to design and store your own custom icons for use in your own programs.

This fabulous new package costs only £89.95 – a price as remarkable as the package itself – and includes a fully illustrated operating manual.

If, however, you are afraid of mice, you can purchase just the software package plus the 16K Super ROM for just £49.95.

You will still achieve some pretty remarkable results using your keyboard or joystick – not nearly as good as with the Mouse of course – but you can always add one later on for just £40.

Then you'll really be 'in the picture'.

AMX MOUSE
AMX SUPER ART
AMX ART
AMX MOUSE

AMX MOUSE

IMAGINATION AT YOUR FINGERTIPS.

BOTH THESE EXCITING PACKAGES ALONG WITH OUR SUPERB RANGE OF AMX ROM AND SUPER ROM COMPATIBLE SOFTWARE ARE AVAILABLE FROM ALL GOOD COMPUTER DEALERS OR BY SENDING CHEQUE OR P.O. TO ADVANCED MEMORY SYSTEMS LTD., FREEPOST, WARRINGTON WA4 1BR. FOR INSTANT ACCESS OR VISA ORDERS, RING (0925) 413501

Gemini ⟶ **1** ⟶

DATAGem

The Definitive Random Access, 24K ROM based Database Management System for the BBC B and BBC B+.

"Excellent if you can afford it..." (ACORN USER Dec. '84)

Now compatible with most double density DFS's

Now You Can! ~~£129.95~~ £79.95

DATAGEM

Long hailed as the most comprehensive and powerful database for the BBC, and now becoming a legend in its own right, DataGem has been significantly reduced in price now that development costs have been recovered by Gemini. Whether you have a single 40 track drive or a Winchester hard disk, this system will make use of ALL your disk space, treating up to 4 drive surfaces as ONE CONTINUOUS FILE. Much has been made and exploited of DataGem's superb selective searching capability, and together with its unmatched mathematical powers, the system provides a really professional database for use in the home, office or school that will harness the full power and potential of the BBC micro.

AMATEURS & PROFESSIONALS

For newcomers to databases as well as seasoned users, DataGem represents an ideal starting point. Structuring your file and layout couldn't be simpler using DataGem's on-screen 'painting' format. You can have up to 62 fields or data items wherever you want them on a scrolling 120 x 120 card. Colours are all definable, and field data and field titles may be separated if required. Data entered may be stored in up to 8 tiers or 'levels', as well as within the whole database file. Scan one level or the whole database for records that match your search parameters, and place them in another data level for later manipulation. DataGem also boasts limited facilities for producing data merged letters, and may be configured as a 62 cell spreadsheet.

TECHNICALLY SPEAKING

The System Comprises:

1. 2 EPROMs mounted on carrier board containing 24K of 6502 optimised machine language. Carrier board may be inserted in either of two positions under keyboard or in sideways ROM board.
2. Demonstration applications disk in both 80 and 40 track format with documented examples of DataGem files. Disk contains no DataGem program code.
3. Full colour packaging consisting of A5 ring binder with professional documentation, user registration card and quick reference card.
4. Utility program named 'Trans' also supplied to allow transference of data files from all other Gemini databases.

The System Features:

- Permits just ONE file to exist over FOUR floppy disk drive surfaces with a maximum file size of at least 10 Megabytes.
- Allows up to 5100 User Definable Records.
- Maximum number of 62 fields per record, which may be any combination of the following types:
  STRING – Up to 120 characters long.
  DATE – Either two or four digit year dates may be selected.
  TEXT – A field with no data, allowing background text to be placed anywhere on the record. This may then be altered/moved/deleted, even after the database is in use. Up to 3000 characters of background text may be placed on the record in this way, enough for limited word processing and mail merge.
  NUMERIC
- Allows searches on any field or COMBINATION of fields to ANY depth.
- Up to 9 subsets of data INSTANTLY available and saved to disk automatically.
- Sorts alphabetical or numeric on any field, ascending or descending with NO LIMIT on the depth of sort.
- Interfaces with 'VIEW' and 'WORDWISE'.
- Includes a free format report generator for a completely flexible printing format.
- Allows the user to extend the file or add fields after having started to enter data.
- Offers a free format painted screen which scrolls 120 x 120, and supports extensive mathematics.
- Provides User defined field relational variables and multiple and single character wildcards.
- Exists self contained on ROM, and does not require additional utilities on disk.
- Finds the occurrence of a string or partial string in ANY field in the database with just one command.
- Mathematical Operators
  + − ★ / multilevel parentheses (up to 50 levels), unary negation.
- Logical Operators
  > < >= <= <> = ★(AND) +(OR)

WHAT OTHERS SAY

DataGem provides many of the Spreadsheet facilities of an item like Lotus 1-2-3. Combined with a Word Processor, it forms the basis of a very competent small business system.
Personal Computer News – July 1984

DataGem stands out in terms of both price and performance. Excellent if you can afford it.
Acorn User – December 1984

NEW DATAGEM GUIDE

Available separately to existing owners of DataGem (see below), this new and comprehensive manual has just been completely re-written by Simon Williams, a veteran press reviewer and writer. The new guide takes you step by step through all the facilities of the program with worked examples, and without any requirement for a previous knowledge of databases. It contains over 40,000 words and is fully indexed.

MONEY-BACK GUARANTEE

The power and facilities of DataGem are just too great to detail in this advertisement. As the product is protected against unauthorised copying, we are able to offer our no-quibble money-back guarantee to customers purchasing DataGem direct from Gemini. If you don't agree that it's worth the price, send it back to us undamaged within 7 days of purchase for ANY reason and we'll refund your money – immediately.

Now available – Wordwise Plus/DataGem MAILMERGE utility – see Gemini page 5!

STOP PRESS!!

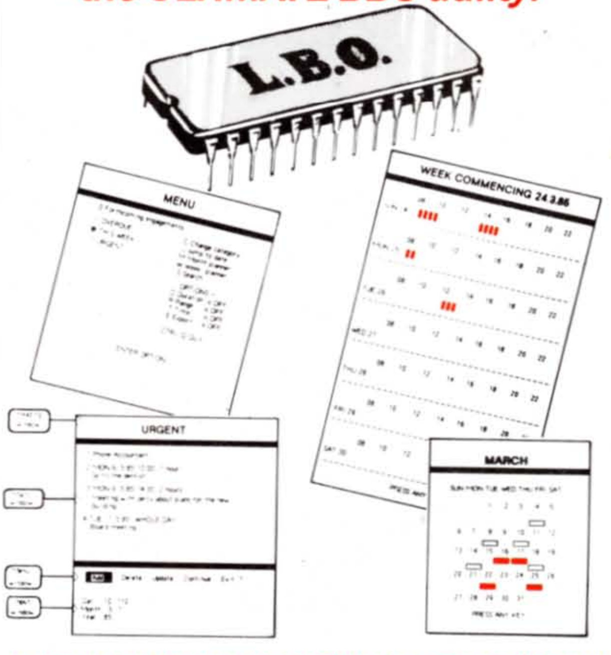
New DataGem owner's manual (see above) available separately at

£12.95 inclusive

Price refundable against purchase!

L.B.O. LIFE & BUSINESS ORGANISER

– the ULTIMATE BBC utility!



A NEW & EXCITING ROM RELEASE FROM GEMINI

This is a comprehensive life and business organiser package in 100% machine code which has been very carefully designed to provide a wide range of useful facilities for the busy person at home or in the office, and is simplicity itself to use. Once you start using LBO, you'll ALWAYS use it – not like one of those ROMs you only occasionally call on. LBO will put an end to forgetfulness and ensure that your time is organised, you know what you have to do and when, you don't forget bills or birthdays, and you are reminded constantly of urgent matters.

LBO was written by two graduates in Computer Science from Exeter University in consultation with a lecturer in Cognitive Psychology. It has been very cleverly researched and programmed and is confidently recommended by Gemini as a very superior program for the very superior BBC micro.

Features include:

- Automatic reminder of entries overdue for attention
- One week's advance notice of forthcoming events
- Urgent notice board
- Creation of categories of entries, e.g. bills, birthdays, letters to be written, notepad etc.
- Sorting of appointments by date and time of day
- Month AND week's summary at a glance, indicating time booked and free
- Single entry of a RANGE of events and updating of regular happenings
- Super search facility to call any event by any related word or part word
- Month by month preview of all forthcoming events
- Built-in intelligent calendar
- All data saved to disk
- Full printer support
- Easy to follow documentation

Use LBO to organise your life from today until 1999! It can handle literally hundreds of multi-line messages, as many as you are every likely to need. Despite the very wide range of facilities offered, this professional program is VERY easy to use and requires absolutely NO knowledge of computers. A vital aid to your everyday life. LBO is GREAT FUN TO USE!

" . . . certainly the best of its kind on the market.
(A&B Computing, March '86)"

L.B.O. only **£19.95**

Also available on DISK for those with a cluttered ROM board – £19.95.
QL version also available now, MS-DOS version early 1986.

Gemini 2

DDD Suite

THE REVOLUTIONARY 'TRIPLE-D' BBC DISK INTEGRATED SOFTWARE SYSTEM

Of great significance to businessmen, educationalists and hobbyists alike, these programs are certainly the most powerful and sophisticated of their breed, and may be used 'stand-alone' or together as a suite. Gemini have probably the most experience in writing serious software for the BBC micro, with classics such as BEEBCALC and BEEBPLOT achieving sales of tens of thousands of units. We have drawn on almost four years of experience and user feedback to produce what we are confident will be hailed as the ultimate in functional software for the BBC micro: the ***'TRIPLE-D'*** Integrated Suite. We've also brought it in at a price that should make it accessible to more of you, and most importantly, we're giving you REAL value for money.

The modules, which are formatted for both 40 and 80 track systems, are available separately, or as an economical combination pack. Each module is clearly documented with a comprehensive, indexed manual, with training sections that refer to demonstration applications provided with each disk. Remember, ***'TRIPLE-D'*** uses proper random-access files that will take advantage of your true disk capacity, even over TWO drive surfaces. Have you ever heard of a true disk-based spreadsheet before? Well it's here now in the form of the ***'TRIPLE-D'*** suite and can handle up to 52,000 FILLED cells! If you already have our 'DataGem' ROM database, you'll be pleased to know we've even included some special utilities for you!

I confidently recommend the ***'TRIPLE-D'*** suite to you. If you purchase the product from us and don't share my enthusiasm, return it to us in new condition within seven days of purchase and we'll refund your money – immediately and without quibble.

Dale Hubbard
Chairman & Managing Director
Gemini Marketing Limited

DDD-BASE £29.95

- Up to 2000 records, 1 search level subset, 26 fields/record, 2 drives, 79 chars/field
- Scrolling screen, 79 x 26. Interrupt driven real-time clock
- Layout painted on-screen to your design, including background text/graphics
- Fully menu driven, with powerful line editor and access to *OS commands
- Default entry capability, no need for tedious re-typing of repetitive data
- Lightning search using advanced 'hashing' techniques
- Powerful maths, allowing all BASIC functions, on any field
- 10 user-defined variables to simplify complex calculations
- Multiple level 'intelligent' sort – program only sorts 'out-of-order' data
- Printed reports in record or summary format. Data spool option for transfer to other files
- FULL DATA COMPATIBILITY WITH 'DDD-CALC' AND 'DDD-PLOT'

DDD-CALC £29.95

- True disk based spreadsheet, 2000 rows, 26 columns, 52000 cells. Powerful line editor
- Fast, smooth machine code screen scroll with pop-down menu
- Individually adjustable column widths with text overflow
- Full relative and absolute replication
- Find and move to a row by name
- User defined variables, delete/insert rows, SORT rows with 'DDD-Base'
- Send data from all or part of sheet to printer, or just print cell formulae
- Data over 1 or 2 drive surfaces
- Fast recalculation, even over large files
- All BASIC functions allowed, plus 'SUM', 'MAX', and 'MIN', *OS calls, and real time clock
- Data spool option for merging with other files
- FULL DATA COMPATIBILITY WITH 'DDD-BASE' AND 'DDD-PLOT'

DDD-PLOT £29.95

- Stunning menu driven colour graphics using the BBC's capability to the full
- Pie charts, histograms, scatter graphs, line graphs and function plotting
- Disk save of screen for instant recall within your own programs
- Superb data entry editor with up to 255 plottable data entries for text and x/y coordinates
- Automatic scaling with user override
- Screen customisation allowable after plotting for background text etc., with up to 64 columns in Mode 1
- Disk save of ALL data
- Statistics facilities include mean, max, min, standard deviation, line of best fit, correlation coefficient etc.
- Colours re-definable for any plot
- Epson m/c fully SHADED screen dump with interface for other dumps on request
- FULL DATA COMPATIBILITY WITH 'DDD-BASE' AND 'DDD-CALC'

Combo Pack – All 3 modules £69.95

Now a Gemini Best-Seller

MONEY MANAGEMENT

Lloyds Bank
Leeds Permanent Building Society
STATEMENT OF ACCOUNT
Lloyds Access

This program is designed for disk users. It allows individual transactions to be stored and retrieved in respect of up to 5 separate Bank/Building Society/Investment accounts AND up to 5 Credit card/loan/Mortage accounts.

The transactions are also analysed – and may be (screen) listed – under 3 separate Income and 15 separate Expenditure headings.

Each transaction consists of:

(1) Date
(2) Description – up to 16 characters
(3) Amount
(4) Last 4 digits of cheque no. or a credit card transaction reference. (Payments only)

Account and income/expenditure headings may be personalised.

Budget amounts can be stored for each of the 15 expenditure heads and a report shows how expenditure to date compares with the budget. It also shows the balance remaining. This report is also produced in percentage terms and a third report forecasts annual expenditure based on expenditure to date at any particular time.

A further report gives balances for each Bank/Loan account at the beginning of the year, balances for each income/expenditure account to date and the resultant Bank/loan account balances. This report represents, therefore, the changes in liquid assets and liabilities over the period, both in terms of totals and of distribution between accounts.

The main menu contains a print option for this report.

Lists of outstanding cheques or credit transactions may be produced for each account and when statements are received, input of the cheque reference no. (last 4 digits) and the amount causes verification to occur (on screen), whereafter these cheques are removed from the cheque no. file, the remaining list of unpresented cheques allowing simple reconciliation of each Bank a/c. Similar reconciliation of credit card a/cs can be achieved.

The program caters for transfers between accounts (e.g. from Bank to Building Society a/c or from Bank to Credit card a/c etc) the relevant details being input only once.

The program also allows for standing orders to be set up on any single account or between any two accounts. These are paid simply by inputting a date up to which the payment of all orders should be recorded. The necessary debits and credits are then created and the date of each order is reset. Orders can be for any multiple of calendar months.

The program is fully menu driven and all areas of input are 'range protected'. As much guidance as possible is included in all screen displays and the user is always given the opportunity to abort a transaction.

Full amendment and deletion routines are provided: for individual transactions, for Standing orders and for budgets.

The main file can hold between 800 (all full length descriptions) and 1800 (no descriptions) transactions. The former should be sufficient for most people for at least one year and the index file size is set on this basis. A warning is flashed on the main menu when the main file reaches 750 transactions. Account balances may be carried forward to a new set of accounts.

All you will ever need in a home finance package and beautifully presented.

ONLY £12.95
Highly Recommended

Gemini 3

With over four years experience of providing practical software solutions for business and home applications, Gemini have put together a selected range of famous titles for the BBC and BBC Plus in TWO special packs, at VERY SPECIAL prices. These super value packs contain all the serious application software you're ever likely to need for your BBC, from spreadsheet and database management to a complete professional business accounting system. Gemini's 'OFFICE MATE' and 'OFFICE MASTER' packs are here – put that computer to WORK!

Office Mate

• DATABASE • BEEBCALC SPREADSHEET • BEEBPLOT GRAPHICS • WORD PROCESSOR • FULL DOCUMENTATION

DATABASE

Use this program for storing all types of information just the way YOU want to store it. You set up a computerised 'card index' system and add records and data to the file in the format that you choose.

Advanced features include sorting and searching for specific records, mathematical calculations, printer routines, data summaries etc. If you don't have a database, you certainly should!

BEEBCALC SPREADSHEET

Perhaps the most commercially successful item of business software yet written, the Gemini Spread Sheet processor offers a very wide range of invaluable calculation and editing features.

Consider, for example, a Cash Flow forecast containing rows and columns of figures, combined with text and numbers. If say, the cash receipts for January need to be changed, it would normally be necessary to delete and recalculate several figures for each successive month.

With BEEBCALC, however, an 'on screen' amendment to the January figure is made, and the corrected figures for each successive month automatically appear upon touching the 're-calculate' key.

Formulae cells in the table may be specified which relate to each other and then copied RELATIVELY or ABSOLUTELY to other parts of the program, which in itself is modular, and directly linkable to other Gemini programs. BEEBCALC has a complete range of inbuilt data entry and formatting techniques, and the structure of the table may be amended at any stage. Of course, full printer facilities are included which allow for either the table to be printed or just the data and formulae relating to the table. Another important feature, any valid BBC BASIC formula is acceptable as data entry making the system immensely powerful and versatile. BEEBCALC's sister program, BEEBPLOT, will take data from disk or tape files created by BEEBCALC to provide data portrayal in graph, histogram or pie chart format.

BEEBPLOT Graphics

Written specially for use with the BBC micro, this program makes full use of the high resolution colour graphics to provide an easily assimilated visual representation of numerical data.

For example monthly sales statistics comparing two year's results may be instantly converted into two side by side pie charts, histograms or graphs ... for easier visual comparison and assimilation.

BEEBPLOT also incorporates a built-in machine code screen dump, enabling a high resolution printed image to be produced using an Epson or similar bit image compatible printer. It also interfaces with other Gemini programs such as Beebcalc and Cash Book and is particularly recommended where any kind of mathematical plotting facility is required.

WORD PROCESSOR

This program provides many routines found in large and more expensive packages. With a typical word length of 5-6 letters it allows for up to 1000 words in memory at one time and is ideal for the user who wishes to write any kind of business letter on a home computer.

Features include: block delete, block insert, search and replace, edit text, display text, and many more.

Step up to Office Mate and save money!
(Price if purchased individually - £79.80
– save £67.80 with this pack)
Electron version available,
pack contains Database, Beebplot,
Beebcalc, Home Accounts,
Cassette only.

OFFICE MATE
£12
Cassette
or Disk

Office Master

• CASH BOOK • FINAL ACCOUNTS • MAILIST • EASILEDGER • INVOICES & STATEMENTS • STOCK CONTROL • FULL DOCUMENTATION

CASH BOOK

Gemini's CASHBOOK is a complete 'stand-alone' accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cash book system and will provide you with a computerised system complete to trial balance.

Simple to use, this program will replace your manual cash and bank records and provide vital management information at any time. It will take you from sheaves of invoices and cheque book stubs to trial balance, and may, if desired, be used in conjunction with the Final Account program.

Typical information from CASHBOOK is as follows: **1.** Summary of VAT information to enable completion of VAT returns. **2.** Cumulative receipts and payments report analysed over the standard profit and loss and balance sheet headings. **3.** Option for departmental analysis of sales and purchases. **4.** Printout of all transactions, nominal account balances etc. **5.** Journal routine for entering transfers between accounts and year end adjustment for debtors, creditors, etc. **6.** Trial balance.' **7.** Full audit trail facility.

This program is recommended not only for businessmen, but also for practising Accountants for use in the preparation of Accounts from incomplete records; a printer is essential.

FINAL ACCOUNTS

Requires Gemini 'CASHBOOK' module (except Commodore 64 version)

This program will take data prepared by your Gemini Cashbook module and produce a complete set of accounts for you in the following format: **1.** Trial Balance with inbuilt rounding routine. **2.** Notes to the Accounts. **3.** VAT summary. **4.** Profit and Loss Account with comparatives facility. **5.** Balance Sheet with comparatives.

All reports may be produced at any time interval comparing actual to budget if required.

MAIL LIST

Gemini's Mailist program will enable you to keep a record of names and addresses and then print, examine, sort and find themn, all with special selection techniques. All our mailists contain our exclusive 'SEARCHKEY' system, giving you the option of creating your own dedicated coding system for each name on file. For example, on most mailing list systems, you are only given the standard heading such as name, street, town, country, postcode etc. With the Gemini searchkey system, you could find, say, all names on the file that are companies having a turnover in excess of '50,000' or all names that are subscribers who are behind in their subscriptions or all names that are eligible for a Christmas card this year!

A full and useful range of routines is included in the menu, and the program allows you to set up your own format for printing labels, i.e. the tab settings you require and spaces between labels, etc. Multiple copies can also be printed.

EASILEDGER

Contains routines to enable the small business man to keep a record of one of the most important aspects of his business – cash flow.

EASILEDGER is essentially a debit/credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information. Its flexibility lies in its ability to produce account balances instantly for debtors and creditors, together with a record of all transactions, dates and references. A year-to-date summary of sales, purchases, receipts and payments over the twelve month period is also provided, as is a complete INTERACTIVE bank account database.

EASILEDGER is a management aid software tool and is designed to run alongside an existing accounting system. If you operate a cash based business and require a complete accounting package to produce the accounts to trial balance and beyond then we recommend you consider using both Easiledger and Cashbook programs together.

INVOICES & STATEMENTS

The Gemini INVSTAT program greatly reduces the time and cost of preparing Invoices and Statements by storing essential information such as customer names, addresses and account numbers, VAT routines and footer messages such as 'Please remit by return', 'Overdue and outstanding', etc.

Not only are Invoices and Statements produced more quickly and accurately, but pre-printed forms for them are eliminated since the INVSTAT program produces professionally formatted documents using your own printer.

STOCK CONTROL

You have a stock of products. With the Gemini program you may enter details of each product on to a record card on the computer with details of your own existing part number (if any), a description of the product, the unit quantity (i.e. one, a gross, a pair, etc.), the cost price per unit, the selling price per unit, a specified minimum satisfactory stock level, units in stock ordering quantity and supplier details.

The program will allow you to enter stock received, stock out, and will also give you a summary of stock items and current holding, together with details of total cost of stock, total sales value of stock, current gross margin on stock, cost of bringing stock up to minimum level, understocked items, etc.

Each stock item has its own computerised record and you may browse through the file as a whole, or just a specified number of records. An extremely powerful program, highly recommended for inventory control in small and medium sized businesses.

OFFICE MASTER
£25
Cassette
or Disk

Gemini 4

INTEGRATED ACCOUNTING FOR DISK USERS

WHY INTEGRATED ACCOUNTING?

Because it will retrieve information stored in one program for use by another, and store data in one program which has been generated by another.

This means that the scope for human transposition error is virtually eliminated . . . for example, when typing an invoice manually, the typist could type £14.25 instead of £42.25, and undercharge the customer. Such an error cannot occur with integrated, computerised invoice generation, since only the part number needs to be entered and the (and product description), are taken AUTOMATICALLY from the Stock Control program, and printed AUTOMATICALLY onto the Invoice.

Likewise a Stock Controller, operating a manual system, could transpose the quantity sold, when posting from a copy invoice, and deduct 93 pcs from the Stock card, instead of 39. This would understate the book stock by 54 pcs, and possibly cause the product to be re-ordered, and consequently overstocked. Again, this could not happen with an integrated system, since the quantity invoiced is AUTOMATICALLY deducted from stock, due to integration of the Invoicing and Stock Control programs.

WHY THE BBC MICRO?

Because, although originally designed as an educational computer, it has the facilities needed for serious business use. In particular, speed of operation . . . although only an 8 bit machine, it has a faster operating speed than many 16 bit micros. By gearing a suite of Integrated Accounting programs to the BBC Micro, Gemini have produced a combination of excellence which will eclipse any other computerised business system in its price bracket . . . and many other systems in much higher price ranges.

WHY GEMINI?

Because our business software for the BBC Micro is based upon the solid foundation of experience. We have successfully written business software for the BBC Micro since it was first launched.

Your choice of software for a computerised business system is critical . . . badly written programs could bring your business nearer to ruin, more quickly than almost any other investment. The fine reputation of Gemini, evidenced by the Independent press comments listed below, are your guarantee of confidence in the professional experience which back this major investment in the efficiency of your business.

INTRODUCTION

Designed for the small to medium sized business user, where speed and efficiency are vital, Gemini Integrated programs are suitable for sole traders, partnerships, or limited companies. All require a BBC B 32K microcomputer, and an 80 column printer. A double disk drive with an Acorn compatible DFS is required for integrated accounting purposes. A single disk drive may be sufficient where modules are used independently, although this is not recommended for the Sales Ledger and Invoicing module. The manuals indicate the system capacities for various disk drive combinations.

The programs have been devised by HCCS Ltd in the light of substantial mainframe computing experience, and share many of the features normally found only in very large installations. used in a typical business environment where invoicing, sales ledger posting, stock control adjustment and nominal ledger posting is simultaneously made, the software will convert the BBC micro into a business computer of enormous power, directly comparable with hardware/software combinations costing many times its price.

Each program is supported by a comprehensive, easily followed manual, and 'user friendly' screen prompts with error trapping routines, which makes a specialised knowledge of accountancy unnecessary for the average user. All the programs, however, have many sophisticated features which make the programs revolutionary for the home micro market.

Gemini Marketing Limited confidently recommend the programs to serious commercial owners of the BBC B micro as software capable of making an enormous contribution to business efficiency and profitability at minimal cost, since it requires no expensive second processor in order to achieve the advantages of integrated accounting.

INVOICING & SALES LEDGER

The Gemini Sales Ledger and Invoicing program will produce invoices and statements for customers and enable a tight control over credit procedures to be maintained by producing aged debtors reports, and by keeping current information concerning customer accounts.

The module can be used independently or interfaced with the Gemini Nominal Ledger and Stock Control modules, and offers the following advantages: • Maintains open-item sales ledger. • Comprehensive customer Master File maintained in memory. • Choice of fixed and free format invoices. • Integrates with Gemini Nominal Ledger and Stock Control modules. • Prints invoices, invoice copies, statements and credit notes. • Reports include: Aged Debtors, Sales Daybook Sales analysis by user defined code, VAT analysis, Audit trail giving copy details of all transactions. • Automatic updating of sales ledger. • Comprehensive accounting controls including period end close down routines and full audit trail for all transactions. • Examine customer status by file enquiry to screen or printer showing year to date activity. • Trade and settlement discount terms definable for each customer. • Caters for up to 5 rates of VAT. • Can hold up to 135 customers on 40 track disk system and up to 610 customers on a 40 track disk system and up to 610 customers on a 80 track disk per Sales Ledger file. • Comprehensive analysis of invoices over unlimited, user definable sales codes.

Price £69.95

STOCK CONTROL

A program providing full control over every aspect of stockholding operations which can be interfaced with the Gemini Sales Ledger and Invoicing program, this module includes the following features and routines: • Inventory Master File holding details of part number, selling and cost price, sales and product code, current stock, location of stock, allocated items, re-order level, quantity on order, current period activity and supplier code. • Permits four types of transactions – sales, returns, receipts and adjustments. • Part enquiry routines for any stock item. • Reports include: Part catalogue, giving stock sales and cost values. Re-order report, Evaluation stocks list, giving stock sales and cost values, Dormant parts report, Delete parts report, Stock usage report, Stocktaking sheet. Stock audit report sorted into part sequence and transaction type and date. • Screen prompt when item falls below the minimum re-order level. • Directly interfaces with Sales Ledger to enable automatic generation of product details for invoice production and adjustment of stock records. • Maximum 980 part numbers on 40 track disk and 1980 on 80 track disk per stock file.

Price £69.95

PURCHASE LEDGER

Used independently or interfaced with the Gemini Nominal Ledger, the program maintains a complete file for each supplier, records amounts outstanding at any time, helps to determine which invoices are payable, and payment dates for the claiming of discounts. Among this module's many features are the following: • Automatic posting of supplier's invoices to Purchase Ledger. • Comprehensive analysis of invoices over unlimited, user definable expense headings. • Comprehensive accounting controls including period end close down routines with posting reports, and full audit trail facilities at appropriate stages of processing. • Full integration with Gemini Nominal Ledger module. • Purchase invoices and credit notes easily processed. • Supplier file held in memory, with full details of each supplier. • Maintains open item purchase Ledger. • Management of invoices due for payment within cash restraints. • Maximum number of suppliers on 40 track disk system of 135 and maximum of 610 suppliers on 80 track disk system per Purchase Ledger file.

Price £69.95

NOMINAL LEDGER

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Jon Vogler – A&B Computing – December, 1984.

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Gemini 6

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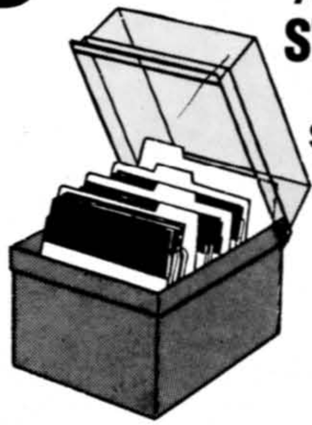

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THE MICRO USER
NEWS
April 1986

How you can check

WORRIED that the B+ you own or are about to buy is bogus? Mike Cook, technical editor of *The Micro User*, explains how you can easily check its validity:

"It would be wise if you are buying a B+ to ask the dealer to remove the four screws holding down the cover of the keyboard. Inside, quite prominently displayed, is the issue number. In 1981 BBC Micros were numbered Issue 3, then came Issue 4 the following year. Finally, in 1985, came Issue 7 for the last B.

"Subsequently the new 64k B+ and the 128k B+ have been renumbered starting at Issue 1.

"Obviously then B+ machines which are numbered anything but 1 or 2 are bogus".

Fake B+ Micros on sale: buyers are warned

AN in-depth investigation by *The Micro User* has revealed that bogus BBC B+ machines are being sold in a nationwide swindle.

Unsuspecting customers around the country are being offered B+ models which contain only basic Model B motherboards cannibalised from older micros.

By selling the doctored B+ machines, the crooks behind the conspiracy have been raking in profits of up to £100 a time.

"This is now a widespread problem", one leading dealer told *The Micro User*, "and it seems to be very well organised.

"The problem is that it is so easy to dupe first time buyers", he added, urging that his name be withheld in case of possible recriminations.

"After all, most are just paying for the name – and that's what they are getting, if only on the case. Even when they learn to use it, many people would not really appreciate the difference between the two models.

"But to those in the know it would be like buying a Jaguar with a Mini engine inside".

How is the B+ scam being organised? *The Micro User* has discovered there is very little problem in purchasing either the separate motherboards or cases.

In nearly all cases of bulk sales Acorn readily ships out both among the spares supplied.

From there on anyone with rudimentary assembly skills can doctor up the bogus B+ machines with ease.

"It's easy money", said one informant.

However the authorities have already been alerted to the conmen's activities.

"We would very much like to hear from any member of the public should they find they have bought a new model with old innards", said Ron Pennington, principle of the Office of Trade Standards for Greater Manchester.

"Given the evidence, these operators could face two charges – each carrying a maximum £2,000 – for issuing a false trade description of goods and selling goods not as new.

"If the offences proved serious enough they could even be sent to Crown Court and face a possible prison sentence".

Show record on way

THE first of this year's three Electron & BBC Micro User Shows is currently on target to break all previous records.

Within days of the announcement that it was to return to the New Horticultural Hall, London SW1 on May 16, 17 and 18, organisers Database Publications reported unusually heavy advance bookings.

"Once again it seems that interest in Acorn products continues unabated", says Derek Meakin, head of Database.

"Naturally the new Master Series – which will be featured prominently at the show – has provided a fillip.

"But that is only part of it. For the sort of excitement these shows generate can only be found within the BBC Micro fraternity. It is this more than anything else that guarantees their success".

The two other Electron & BBC Micro User Shows to be held this year are scheduled for Umist, Manchester, on September 26, 27 and 28, and at the New Horticultural Hall, once again, on November 7, 8 and 9.

Watford raps modem muddle

ONE of the leading entrepeneurs in the BBC Micro marketplace claims that government red tape is currently costing him thousands of pounds a week in lost business.

Nazir Jessa, managing director of Watford Electronics, says the situation has arisen because of bureaucratic delays in approval procedures for modems.

As a result Watford's Le Modem is being forced to display a red triangle denoting that it does not have the official blessing.

It is this that has upset Jessa. For the company has discovered that the sticker is being interpreted by prospective customers as meaning the modem is unsatisfactory.

"The red triangle is hindering not only my business but the modem business as a whole", Jessa told *The Micro User*.

"As soon as customers see it they shy away from the product". But the complexities surrounding the issue have put Nazir in a Catch 22 situation.

"If I wait for approval before I put Le Modem on sale I could find that the technology is out of date.

"Alternatively I could sell it without approval as I am doing, and risk customer disatisfaction. I either ignore BT regulations or lose business. It really is a no-win situation".

According to Jessa the situation is made even more ridiculous because Le Modem uses all BT-approved components and buyers are offered three months free subscription to Micronet which is partly owned by BT.

"There is no doubt in my mind that Le Modem will sail through the testing process – that's if it ever gets that far.

"The amount of paper-

Turn to Page 24

Design wins a plotter

THE computer section of the British national nativist competition was won by 17-year-old BBC Micro users Darren Capel and Richard Hibberd of Long Buckby in Northamptonshire. Their design, The Road to Bethlehem, was the only entry in the competition to attempt the use of both colour and texture.

It took the boys 170 hours work to arrive at a software configuration which succeeded in expressing their ideas. At no point did they resort to listings from commercial graphics programs.

Darren and Richard, pictured above with their winning entry on screen, won an HI-80 colour plotter by Epson.

MINI OFFICE STAYS ON TOP

NEARLY two years after it first appeared on the market, the original version of Mini Office – the database, spreadsheet, word processing and graphics package from Database Software – is still topping the charts.

The latest Top Five list of non-game software in *Acorn User* magazine, compiled by Gallup, reveals that Mini Office continues to lead the pack.

It beats Speech from Superior Software into second place followed by Music System from Island Logic, Typing Tutor from Pitmansoft and Forth from Acornsoft.

An updated version of the package, Mini Office II, containing many additional features, is now available.

Modem muddle

From Page 23

work involved is astronomical and the time taken to process an application is notoriously slow.

"I would like to see a way of improving the BABT approval system while in the meantime educating the customer as to the real implications of the red triangle".

AMS push Pagemaker

A MAJOR advertising campaign to promote its already highly successful Pagemaker software package has been launched by Advanced Memory Systems at a cost of £30,000.

It features this sleazy, cigar chomping, bourbon swilling journalist holed up in a motel room waiting for the big story to break.

"We are just carrying on with our theme that Pagemaker not only creates the headlines but makes them as well", Nick Pearson, managing director of AMS, told *The Micro User*.

"And judging by the way sales have been going and the publicity we have received this couldn't be more accurate".

The Pagemaker package combines a low cost typesetter, graphics and word processor on two ROMs and two discs.

It lends itself to letters, notices, posters, menus – in fact anything that needs to be created on A4 size paper, including school newspapers and college magazines. The latest news on the Pagemaker front is that it can be used with both keyboard and joystick as well as the AMX Mouse.

Waiting for the big story to break

At the same time compatibility with the Opus Challenger, a plug-in disc drive system for the BBC Micro priced at £249.95, has been announced.

- Late news flash – Advanced Memory Systems has announced that Pagemaker is now available for the new Master 128 series.

Looking for a Lennon

A NOVEL competition to find a modern Chopin or a new Lennon has been launched by System Software for BBC Micro users.

All schools using the company's Music System have been invited to compose a three minute piece, classical or contemporary, using the sounds and facilities on their program.

Prizes for both primary and secondary school pupils include Epson RX80 printers and 40 track disc drives.

Last day for entries is May 12.

System Software at Sheffield stress the budding composers must submit original works to the panel of judges, which will include music teachers and musicians.

NEW RAM ADD-ON

SEAWELL Automatic Controls, at Andover, Hants, has launched a publicity campaign for its Sacram 256k RAM add-on.

It is connected to the BBC Micro by a 34 way ribbon cable which plugs into the 1mHz bus. The associated ROM may be fitted to any of the sideways ROM sockets.

The ROM-based software provides four star commands which enable large chunks of data to be moved about between Sacram, the micro and disc.

The Sacram is accessible from Basic using the available star commands. Price £199.

Adventure generator

INCENTIVE Software has launched the Graphic Adventure Creator for the BBC Micro.

Creator is an adventure generator with a built-in graphics editor.

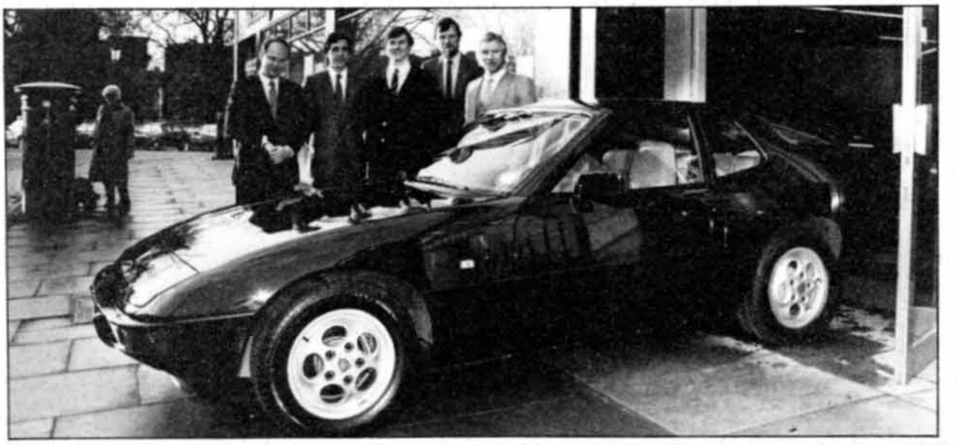
It costs £22.95 on cassette and £27.95 on disc.

Mike buys printer, collects Porsche

BBC Micro owner Michael Fowle of Edinburgh is travelling in style these days. Here he is, pictured centre with the £14,000 Porsche 924S he won in a competition organised by printer manufacturer Star Micronics.

Since last September every Star printer buyer has received a numbered key, one of which fitted the prize.

Fowle bought a Star SG-10 for his BBC Micro system from Scottish distributors Microworld Computer Group of Edinburgh.



BBC COMES OUT TOP OF THE CLASS IN ULSTER

THE BBC Micro is now number one in the six counties of Ulster. According to the latest report from the Northern Ireland Council for Education Research, the BBC B can now be found in more than 90 per cent of the province's post-primary schools.

Compiled by John D'Arcy under the title of "Mathematics and the Micro", the study was mainly concerned with the use of computers in that academic area.

However the author also sought details on the use of micros throughout the whole school environment.

D'Arcy discovered that the average number of micros in post-primary schools in Northern Ireland is now more than six.

These machines are being used to teach a variety of subjects including modern languages, art and music.

The report says the micro as a learning tool can most often be found in mathematics, geography, science and history classes.

Motivation

A detailed examination of the BBC Micro in the Northern Ireland maths classes revealed the machines were being primarily used in the areas of graphs, coordinates, geometry, statistics and basic number work.

D'Arcy concluded that the machine had much to offer mathematics teachers not only in its speed, accuracy and graphical qualities but also in the increased motivation of pupils.

RAM disc range

PERMANENT Memory Systems has launched a Z range of non-volatile RAM discs.

The products are for use with the B or B+ with Z80 Second Processor.

Users can now have from 64k to half a megabyte of permanent, battery-backed, RAM configured as any CP/M drive.

Once the RAM disc is selected it behaves as a conventional disc, with one exception – access times can be up to 10 times faster than floppies.

Any CP/M programs can use the RAM discs, and Z80 BBC Basic random access filing is fully supported.

The Z80 version of the system, Z– ROS, is contained in a sideways ROM.

Entry to the range is by the PMS Z-64, a single non-volatile RAM disc which can be exchanged later for the motherboard unit which can contain two to eight 64k units.

The PMS Z-64 costs £113 and includes the 64k RAM disc, Z-ROS in ROM and user guide.

"The board system is not as yet available for the 6502 second processor but we are working on it", says PMS.

Hotline quiz

IF the world was poised on the brink of a nuclear war and the hotline between the super powers was down could you repair it in time?

This is the task set by Chalksoft's latest offering, Hotline Quiz – but it's more than just a game, it's a flexible learning tool.

To repair breaks in the line the player must correctly answer a series of questions, using one of the general knowledge sets supplied or creating original testing programs as a homework exercise.

Scores are shown by a lengthening line joining up the broken hotline. Random order and repeat tests are possible, and a fully correct quiz sets the telephones ringing. Price £14.25 on disc only.

Program exchange planned

A NEW division of publishers Software Express has been created to boost the number of programs available to BBC Micro users.

It has already reached a number of licence agreements that entitle it to import a range of products from the US and to get British software distributed in America.

A key element in the new venture is program exchange – an open invitation to professional software houses and hobbyist programmers alike to join in the venture.

"We see our role as being like that of a record company, publishing software from many sources under one label", says Jon Dean, who is in charge of the project.

"We would welcome the opportunity of evaluating software from professional and amateur authors.

"Quite often home programmers have the best new ideas and approaches to software, but their programming skills are weak".

BRIGHTER POSTERS PACK

HOMEMADE posters set in old style type look like being the new "in" for BBC Micro users.

Permanent Memory Systems at East Kilbride has come in with a multi-font near text quality printer driver.

It is directed at schools and colleges needing worksheets and displays and churches and clubs seeking to brighten up their newsletters or notice boards.

The portable PM 64k non-volatile RAM module plugs into the BBC Micro to give the various kinds and sizes of type required.

PMS cost the total package at £148.95.

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Vector 1 versions compatible with Acorn, Opus, UDM, Cumana, BBC+ & Watford (Not 1-42, 1-43) DFS's.

▪VECTOR 2▸

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Features:

- + 40/80 Format
- + User friendly, menu driven
- + Contains powerful features such as a disk sector editor, Disk Compare, format, verify and track repair
- = The most powerful disk utility available

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The latest release from Chalice software, over 60 commands on a 16K ROM. The range of commands available means that there is something for every BBC user. For the disc user the ROM provides a skewed formatter to speed up disc access, a disc sector editor, disc search, verify and repair utilities, a useful free space command, plus many other handy commands. For the BASIC programmer, commands include search and replace on a global or selective basis, list active variable values, append BASIC program, move and copy lines, bad program repair, a highly effective routine to shrink BASIC programs down to a far smaller size etc. Other commands include disassembly, memory edit, graphics compilation, comprehensive file transfer utility, function key lister, envelope lister, rom lister, rom save, full rom status, switches roms off through <CTRL><BREAK>, send commands straight to a ROM, KEEP command, inverse video command, a command to send codes direct to your printer, memory search, base conversion, display character definitions, close open files and many others. All commands have been chosen on the basis that they are useful and not as space fillers.

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OVER 60 COMMANDS

the SCYTHE

The Scythe toolkit contains a version of the VECTOR 1 tape to disc system, which will transfer most protected tapes, but we have not stopped there. The Scythe has been packed with a host of other commands: MDIS, SDIS, MEDIT, KLIST, BASE, ROMLIST, ROMSAVE, NROM, FLUSH, FORMAT, VERIFY, FREE, SFIND, BFIND XLIST, BAD, MRELOC, SLOW, TDISK, VECTOR, ROFF, RON, SECTLOAD, SECTSAVE, MSHIFT & MSWAP. These commands cover everthing from ROM management, utilities for the disc user, aid for the machine code or BASIC programmer, and a set of general utilities of use to all BBC users. The commands will accept input in HEX, DECIMAL, BINARY and the resident INTEGER variables making the Scythe very easy to use. The Scythe comes complete with a comprehensive manual and a free utilities disk.

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ROM MASTER

ROM Master is a budget utility ROM designed for people with several ROMs on their BBC computer. ROM master has several utilities to help prevent the interference which can occur between different ROMs, any ROMs that cause problems can be switched off even through <CTRL> <BREAK>. Using ROM master has been designed to be as easy as possible. Most commands will accept lists, so you can, for example, switch off several ROMs with just one command. ROMs can be specified by their socket numbers or their title or even abbreviations of the title. 20 commands are available, please send for full details.

As a bonus feature for anyone who has files they want to keep from prying eyes, ROM master contains the commands SCRAMBLE & UNSCRAMBLE which will encrypt or de-encrypt a file based on an entered password. The encryption used is highly sophisticated so unless you know the correct password the files cannot be read.

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Interactive video plan for BBC

Lizette Heathcock and Janet Rothwell working on the interactive video disc-based robotics training programme on a BBC Micro at NCC.

THE National Computing Centre is working on the development of low cost interactive video involving the BBC Micro.

It will connect a standard domestic VHS recorder with a BBC Micro and use the Microtext authoring language developed at the National Physical Laboratory.

"This is in line with our philosophy that solutions are now available at acceptable cost for implementing even the most powerful computer-based training systems", says Dr Matthew Dixon of NCC's Information Technology in Training division.

"We are also working on integrating intelligent knowledge-based systems techniques into CBT tools to produce in the long term extremely powerful knowledge management systems that can be used for decision support or in-situ training".

NCC's pool of expertise in CBT is now being focused on building a thriving technology transfer business as part of the centre's new Knowledge Management Systems business area.

Research and development funded by the Department of Trade and Industry has produced a series of reviews of CBT technology, culminating in a reference work on the current status of interactive video.

It has also created a practical demonstration training module on robotics, prepared on a BBC Micro-based interactive video system, for Jaguar cars.

Sounds shape up on the screen

THE Barry Box, which samples sounds and records their shapes on screen, has been launched for the BBC Micro by electronics wizard Dr Barry Landsberg.

With the help of his wife Linda he runs BML Electronics at Milton Keynes, where they have been producing communications software.

Linda said: "The Barry Box should have a great appeal to physics students, appreciating the various shapes that different sounds make.

"Musicians can tune up, playing a note and checking it reaches the correct pitch on a projected graph.

"It can also be used with games – introducing your own voice or sounds instead of the usual explosive noises".

Another feature of the little chatter-box is its triggered recording. If a light detector is attached to a computer the recorded barking of vicious sounding dogs could be played back the moment it senses the beam of a thief's torch.

The package, including user guide, microphone and ROM costs £79.95.

Contex Mk 5

DESIGNED for BBC disc systems only, the Mk V version of its spreadsheet program has been released by Contex Computing.

As well as the normal spreadsheet features it has Mode 7 graphics and its own programming language.

Using a word processor, a Basic program or the *BUILD command, the user can develop program command files that are used by the spreadsheet program to control input to selected cells and the printing of the sheet. Price: £17.50.

Fleet Street Editor wary of pirates

MIRRORSOFT'S popular Fleet Street Editor discs have been snapped up by 3,500 BBC Micro users in just four weeks.

The final software is now protected, but Pat Bitton, marketing manager at Maxwell House, is asking reviewers to return the unprotected pre-production software.

"I hope you understand that we can't afford to take the risk of having even unfinished unprotected software for a product such as Fleet Street Editor not under our control", she told them.

The discs – coloured red following the Mirror's logo – have been so well protected that it would take a semi-professional to make a copy, says Ms Bitton.

She said 15 system, pre-production discs were sent out and not all had yet been returned.

She is asking reviewers to watch out for any pirate software on standard black discs. "Any on black will be considered a pirated copy unless proved otherwise", she added.

PRINTERS THAT UPSET PICKETS

A TELEPHONE order to a leading supplier of printers to the BBC Micro market almost ended up in a punch-up recently.

The request was for DataStar Systems to deliver 50 machines the same day to an address in the East End of London.

There was nothing surprising in that, as the company regularly delivers large orders at short notice.

However, when the driver turned up at 1 Pennington Street, Wapping he found he was decidedly unwelcome.

For that just happens to be the new headquarters of Rupert Murdoch's News International. And, as the company is currently at the centre of a dispute with all the main printing unions, it was ringed by hostile pickets.

When the DataStar driver told them he had 50 printers in the back of his vehicle they were decidely not amused.

But anger turned to embarrassment when the van doors were opened to reveal that the printers were of the computer variety.

"Everyone had a good laugh about it in the end", said Barry Krite, managing director of DataStar.

"Unfortunately the last laugh was on us – we discovered the phone call was a hoax".

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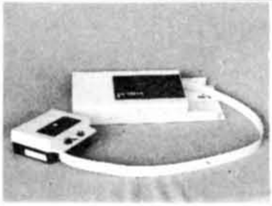

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*SAYPRT. This intercepts the printer output so that it can speak listings etc, rather than printing them. CTRL-B and CTRL-C turn the speech on and off in the same manner as the printer.

*PHONS <text>. This will speak any text following the command, but also displays the phonemes of the words as it says them.

*SAYSCR. This will read all text currently on the screen.

*SHUTUP. This stops it speaking and clears all buffers.

All of the above commands will speak lower case text on a word by word basis–upper case words are spelt a letter at a time. This option may be turned off. All these commands may be used from BASIC or WORDWISE PLUS programs.

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These ROMs require the Acorn speech processor to be present in the machine. This is available separately from us for £10.00 incl. VAT.

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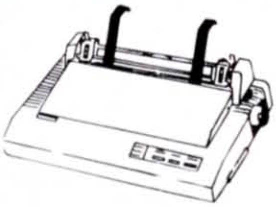

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BBC Firmware

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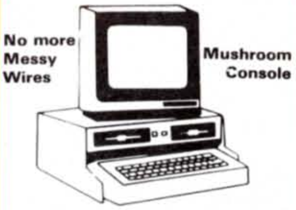

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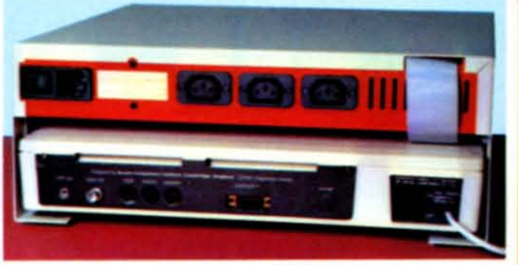

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NLQ Designer for Canon and Taxan Kaga NLQ Printers.

Design your own NLQ fonts or 'download' one of our 20+ predefined fonts. The FONTAID disk includes the following type styles:
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FONTAID requires 6264 RAM Chip in printer.

FONTAID (BBC)	**£30.00**
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Please state 40 or 80 track when ordering.
ROMS of individual fonts are available and can be used with any computer.

FONT ROMS	**£18.00 each**
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BBC B + 64K + DFS + Econet	**£389**
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Dust Cover for BBC Micro
£3.50

EPSON LX-80 PRINTER

Low cost, High performance printer. Print speed 100 cps, NLQ mode 22 cps. Full FX80 compatible. Friction feed supplied as standard. Tractor Feed & Auto Single Sheet Feeder, optional extras.

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(Securicor carriage charge on printers £7)

RX & FX PRINTER INTERFACES

Epson interfaces fit inside the printer to allow connection using techniques other than Centronics.

RS232	**£25**	RS232 + 2K Buffer	**£55**
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CENTRONICS GLP
Brother M1009
(NLQ) Printers

A major price break-through in NLQ Printers from Watford

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Single, double and quadruple density graphics modes as well as four character widths and super/sub script printing are also supported, along with many other facilities normally found on printers costing twice as much.

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GLP is bidirectional logic seeking. Has a 9 needle print head. Now available in Serial, Parallel or QL compatible. Please specify.

Send an SAE for further details of the GLP NLQ Designer and extra font ROMs.

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Individual FONT ROM **£14**

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Brother HR15 is a high-quality daisy-wheel ideal for a budget printer for serious use. Notable features of this printer include a 3k buffer, 18cps (max), bi-directional proportional spacing, Centronics interface standard, (RS232 optional), optional Sheet Feeder and Keyboard.

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Enhancing the Japanese reputation for quality at a reasonable price, Watford are pleased to offer the new Brother HR10 Daisywheel printer at a new low price that is within the pocket of most Hobbyists and small businesses.

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(Ideal for School environment)

Connect 3 BBC Micros to 1 Printer	**£65**
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(Cables extra)

KAGA KP810
NLQ PRINTER

This rugged printer is made by Canon of Japan and is the same as Canon PW1080. It is fully Epson FX80 compatible and offers superb NLQ printing.

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Kaga RS232 Interface	**£49**
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KAGA KP910 Printer

Similar to the KP810 but has 17" wide carriage for wide print. Gives 156 columns of normal print or 256 columns in condensed mode. Ideal for printing out spreadsheets.

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Centronics lead to connect BBC micro to EPSON, KAGA, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA etc. printers.

Standard length (4 feet long)	**£6**
Extra long (6 feet long)	**£8**

We can supply leads to any required length.

RS232 Cables available in any length and any combination. Please telephone for your requirement.

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- Medium Resolution, attractively finished, 14" RGB and Composite VIDEO/AUDIO Input. Has a detachable anti-glare screen.

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RAMs (Low power) for ATPL, WATFORD, etc., Sideways ROM Boards

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A complete word-processing package (which can be heavily modified to your requirements, maintaining the large discount). We supply everything you need to get a BBC micro running as a word-processor. Please call in at our retail shop to discuss your particular requirement and a demonstration.

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BBC B Plus (64K) Micro; Wordwise Wordprocessor, Twin 800K Double Sided Mitsubishi Disc Drives, Zenith Hi-Res Green Monitor, Brother HR15 professional quality Daisy Wheel Printer, Gemini Database, Spreadsheet, Beebplot Graphics, Accounts Pack: (Cashbook, Final Accounts, Mailist, Easiledger, Invoice & Statements and Stock Control) Software packages on Disc with Manuals.

NEW LOW PRICE

Only £999

THE EPSON RX/FX/KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX/KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, Canon PW1080A or any Epson FX80 compatible Printer with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

Superb Value at **£5.95** (No VAT)

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You no longer have to fiddle with the brilliance control or work in the shade as this NEW Mark II Light Pen is totally insensitive to local lighting conditions. It only operates on high frequency light from the TV or Monitor.
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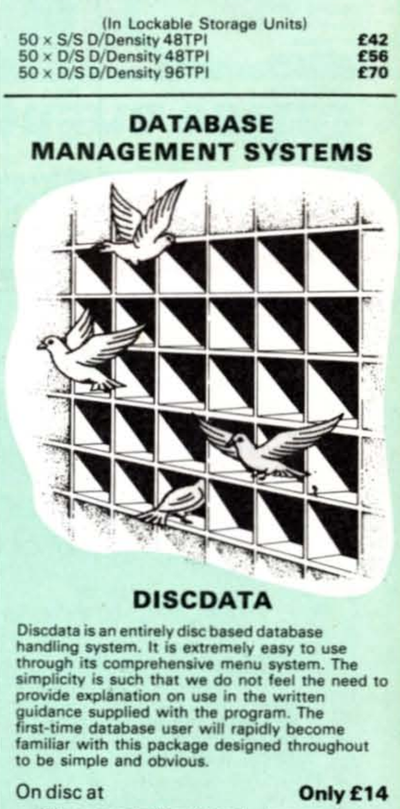
50 × D/S D/Density 96TPI	£70

DATABASE MANAGEMENT SYSTEMS



DISCDATA

Discdata is an entirely disc based database handling system. It is extremely easy to use through its comprehensive menu system. The simplicity is such that we do not feel the need to provide explanation on use in the written guidance supplied with the program. The first-time database user will rapidly become familiar with this package designed throughout to be simple and obvious.

On disc at **Only £14**

(Please specify 40 or 80 track when ordering)
(Please write in for technical specifications)

FILE-PLUS

File-Plus is a powerful database for the BBC micro with many advanced features. Largely menu driven, File-Plus is provided on a 16k ROM with some extra utilities on disc. Features included are detailed below:

- Flexible full screen form layout.
- Built in File Query Language (FQL).
- Printer Output.
- Arithmetic operations in FQL.
- Looping in FQL.
- Number range of +– 9999999999.9999.
- File linking allows files over different drives.
- Multiple forms allow selection of displayed data.

Only £25

(Please specify 40T or 80T disc

Continued →

The ULTIMATE DFSs for the BBC MICRO

WATFORD TOPS THE DFS CHART

Watford's Ultimate DFS has scored highest points in ACORN USER's unbiased DFS's Review of July 1985.
In concluding, the reviewer writes "It must be said that Watford's DFS certainly offers a comprehensive range of facilities at a very attractive price". (Please write in for comprehensive details.)

Just compare the features:

Features	Acorn	Watford	
	1.20	Single Density	Double Density
Max nos. of files per disc side	31	62	62
Max disc capacity	800k	800k	1440k
Tube compatible	Yes	Yes	Yes
Built-in Editor	No	Yes	Yes
Built-in Formatter	No	Yes	Yes
Built-in Verifier	No	Yes	Yes
MRUN a file	No	Yes	Yes
MLOAD a file	No	Yes	Yes
Extended RENAME	No	Yes	Yes
Selective COPY	No	Yes	Yes
Default file name	No	Yes	Yes
Disc space distribution	No	Yes	Yes
40/80 Software Switchable	No	Yes	Yes
Wide catalogue	No	Yes	Yes
Close open files	No	Yes	Yes
Improved OPENOUT	No	Yes	Yes
Copy between densities	N/A	N/A	Yes
OSWORD &7F	Yes	Yes	Yes
Full entry point compatibility	Yes	Yes	Yes
Retain information over a break	1.20	1.43	1.53
	partial	Yes	Yes
Games compatibility	Yes	Yes	Most
Econet file server	Yes	Yes	Yes
Econet station	Yes	Yes	Yes
Full wildcard facilities	No	Yes	Yes

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for three years, and has gained a large following amongst serious users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. (P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS).

PRICES

- *Complete Disc Interface Kit incl. DFS ROM & fitting instructions* **£47**
- *Acorn's DFS Kit complete* **£47**
- *DFS Manual (Comprehensive)* *(no VAT)* **£6.95**
  (P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs)
- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *DNFS ROM only* **£17** ● *ADFS ROM only* **£25**
- *Watford's DFS is exclusively available from Watford Electronics. Every ROM carries a special label with our LOGO and serial number.*

WATFORD's DOUBLE DENSITY DFS INTERFACE

The DDFS from Watford Electronics represents a new standard in DFSs for the BBC micro. This is a double density version of our popular single density DFS, and combines all the features of this powerful DFS with the advantages of a system that gives 80% more storage per disc in double density mode. P.S. – Please note that not all DDFSs are capable of providing either the full 80% storage increase, or of allowing a file the full size of the disc – Ours allows both of these!

The typical piece of games software these days is provided upon a protected disc. In order to work on any double density system (including the others on the market) a protected piece of software needs to make calls through the OSWORD &7F routines. To ensure compatibility, the Watford DDFS features probably the most comprehensive and powerful 8271 emulation ever written for a double density system.

PRICES

- *Complete DDFS Kit incl. fitting instructions* **£46**
- *DDFS Manual* *(no VAT)* **£6.95**
- *We will exchange your existing Single Density DFS Kit for our DDFS Unit at* **£35**

Watford Electronics DDFS PLUS for the BBC B Plus

Watford Electronics was the first company to produce a serious alternative Disc Filing System (DFS) for the standard BBC micro. Since then, we have been refining and advancing this sophisticated product right up to today.

Now WE'VE DONE IT AGAIN; Watford proudly presents the Double Density Disc filing system for the BBC B+, with all the advantages of the advanced Watford DDFS available on the new BBC B+ DDFS.

Acting as a powerful alternative DFS to Acorn's '1770 DFS' supplied with the BBC+, this superb addition to any BBC+ greatly enhances it's performance with a simple fitting operation.

DDFS PLUS incorporates all the features of the Watford's popular DFS & DDFS for the BBC B, (at the same time retaining full compatibility with Acorn DFSs), plus it has the following extra features:

Automatic density selection – Full single and double density operations – Extremely powerful and comprehensive OSWORD &7F emulation – Any file can be full size of disc – Density of last access assumed for speed – Automatic 40/80 stepping swapped on error – All Acorn's extra disc commands implemented.

As you can see from the above information, Watford's DDFS for the BBC+ is far more sophisticated and well thought out than the standard. Take any disc produced by any Watford DFS from the standard BBC and catalogue straight off with no problems.

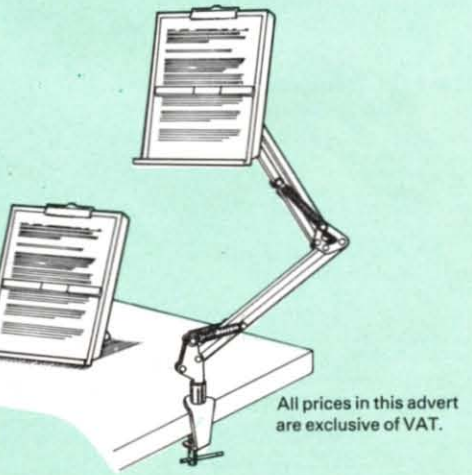
Unlike the Acorn 'ADFS', our DDFS+ system is just as easy to use as the standard DFSs, with no new complex concepts to have to learn. The features within our DFSs have been constantly enhanced over a period of three years during the time that they have been released; significant attention has been paid to feedback from our customers so that the features offered are carefully honed to the requirements of hobbyists and serious programmers alike.

The Watford DDFS+ is supplied with a comprehensive DDFS manual that explains the basics of disc drives, DFSs, etc. Priced at only £30 including the manual, the Watford DDFS+ is surely one of THE best buys you could make for your BBC B+!

Join the leaders in BBC peripherals; join Watford Electronics – committed to supporting the BBC micro.

DDFS PLUS (for BBC Plus) **£30**
(Price includes comprehensive
manual)

COPY HOLDERS



All prices in this advert are exclusive of VAT.

How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.

Available in desk resting and shelf clamping versions, these two units hold your paper firmly by means of a magnetic ruler and a clip grip.

Mounting to a convenient flat surface, the two joint anglepoise Manuscript Holder allows the paper to be positioned at virtually any convenient angle whilst only taking up a fraction of the surface area that the paper being held does.

The smaller desk resting Manuscript Holder is useful for the more organised desk where the problem is simply holding the paper at the right angle.

Whatever desk arrangement you use, surely you deserve a Watford Manuscript Holder!

Amazing value at only
Desk Top **£10** (carr. £2)
Angle poise **£17** *(carr. £3)*

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates the single density capacity. The double density storage capacity is second one, (that within the brackets). All disc Drive type numbers start with the prefix "C".

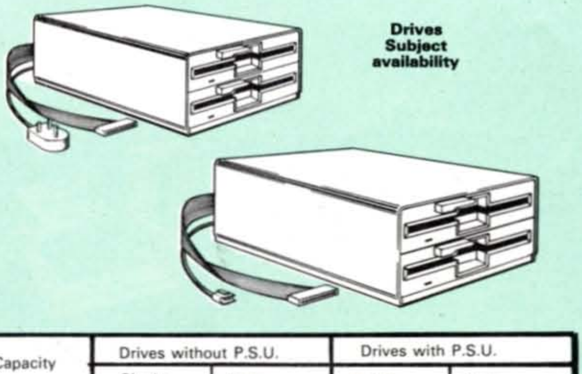
The tinting on some of the boxes is used to indicate which Drives are 40 track and which are 80 track. The 40 track ones are manufactured by EPSON, the world famous Japanese company, (non-tinted boxes). The 80 track drives are famous MITSUBISHI drives (tinted boxes).

With two prices in a box (e.g. £295/£299), the first price is for the standard drive and the second for the same unit in switchable type. Users of either of the two Watford DFSs will not need switchable drives as their DFS will provide software switching for them.

***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the MITSUBISHI and EPSON drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*
Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality Epson and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.
Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate: extensive tests within our workshops have confirmed this. All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. (Ideal for Schools & Colleges. All single disc drives with power supply, (i.e. CS100, CS200 & CS400S) are supplied in a twin case with twin data cable for later inclusion of a second drive). At Watford we anticipate your needs of tomorrow not just today!

When using a BBC Micro, most people find themselves preciously short of space. The Watford's BBC Micro Plinths form an ideal way of recovering some of this space; your BBC, disc drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. Some of our competitors offer disc drives built into plinths, but these aren't as sensible as you might think. With a Watford Plinth, your disc drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen and paper, reference manuals, etc. Follow the trend with Watford Plinth.



Drives Subject availability

Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
100K (180K)	CLS 100 £75		CS 100 £110	
200K (360K)	CLS 200 £91	CLD200 £169	CS 200 £110	CD200 £185
400K (720K)	CLS 400 £96 £98 CLS400S	CLD 400 £169	CS 400 £115 £117 CS 400S	CD400 £182
800K (1.44M)		CLD800 £181 £183 CLD 800S		CD 800 £197 £199 CD 800S

- TWIN Disc Drive Case, complete with Power Supply & Cables **£35**

Securicor carriage on Disc Drives £6

Prefix **C** *= Cased Drive*
L *= Less PSU*
S *= Single*
D *= Double*

Suffix **S** *= 40/80 Switchable*

e.g. CLS400S = Cased drive, Less power supply unit, Single 400K, Switchable (40/80 track).

MYSTERIES OF DISC DRIVES & DFS REVEALED

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive? What is the difference between a DFS and disc interface kit? Should you acquire a single Disc drive or twin? What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford's new book entitled 'MYSTERIES of DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

£5.95 (Book No VAT)

3M – DISKETTES

Top quality 3M – SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All our discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick disc labels and write protect tabs.

● *10 × 5¼" S/S D/D 40 Track Diskettes*	**£12**
● *10 × 5¼" D/S D/D 40 Track Diskettes*	**£15**
● *10 × 5¼" S/S D/D 80 Track Diskettes*	**£22**
● *10 × 5¼" D/S D/D 80 Track Diskettes*	**£22**
● *10 × 3½" S/S D/D 40/80 track Discs*	**£25**
● *10 × 3½" D/D D/D 40/80 track Discs*	**£35**

TOP QUALITY 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

DON'T SETTLE FOR LESS, BUY THE BEST

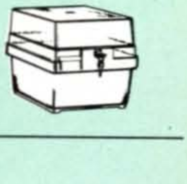
- *10 ×* **M4** *S-S D/D 40 Track Discs* **£11**
- *10 ×* **M5** *D/S D/D 40 Track Discs* **£14**
- *10 ×* **M7** *D/S D/D 80 Track Discs* **£19**
- **3"** *Double Sided Discs* **£4** *each*

DISC ALBUMS

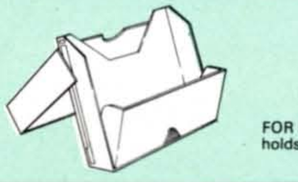
Attractively finished in Antique Brown, leather look vinyl. Stores upto 20 Discs. Each Disc can be seen through the clear view pockets. **£4**

LOCKABLE DISC STORAGE UNITS

Strong plastic case that afford real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.



M35 - holds upto 40 discs	**£9**
M85 – holds upto 95 discs	**£12**



PLASTIC LIBRARY CASES

FOR 5¼" DISC STORAGE holds 10 Discs. **£1.80**

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use.

£8

DUST COVERS (For our Disc Drives)

Single (without PSU) **£3.20**	Twin (without PSU) **£3.85**
Single (with PSU) **£3.95**	Twin (with PSU) **£3.90**

EPSON NLQ ROM
for the BBC Micro

Harness the full potentials of your Epson RX & FX Printers. Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ! (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:

- Simply type *NLQ80/100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80); ENLARGED type; UNDERLINED type. These features can be used seperately or in any combination.
- Full UK character set; Standard 'pica size'; Proportional spacing; Enlarged; Underlined; Normal type.

The NLQ ROM is supplied complete with comprehensive manual.

P.S. NLQ ROM is compatible with the Torch Z80 system and can be used from within the Perfect Writer software.

Only: £25

VIEW PRINTER DRIVER for NLQ ROM

This specially written printer driver has been designed to allow View access to the full features of our NLQ ROM.
A must for all VIEW and NLQ ROM users.

£7.00

THE NLQ DESIGNER

KAGA KP810/910 and Canon PW1080 are two superb printers, as our many thousands of satisfied customers would surely attest to. One of it's particularly strong points is the NLQ option that it offers; perhaps one of the more weaker points is the effort required to design your own custom NLQ font.

Well the solution is here NOW in the shape of Watford's NLQ DESIGNER ROM! For the BBC Micro. This powerful piece of software allows easy design and entry of a full NLQ font, with further fonts recallable from disc. Once a font has been programmed with the versatile NLQ DESIGNER, it can be saved to disc, downloaded to your Kaga (or Canon) printer, or even programmed into an EPROM (given the appropriate hardware) and then plugged directly into your printer so that it is available immediately when you turn it on. Downloadable Fonts require 6264 RAM chip fitted.

A 40/80 track format disc containing 3 example fonts is included in the package.

(P.S. This ROM is not suitable for Epson printers as they don't normally have NLQ ability. Keep reading our adverts though – work is in development!)

- NLQ Designer ROM & FONT Disc **£25**
- Kaga Individual FONT ROMs **£15**

Now available:

- Centronics GLP Printer NLQ Designer ROM **£20**
- GLP Individual FONT ROMs **£14**

(Write in for further details on both).

DUMPOUT 3

A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!
The ROM also provides window setting utilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. The latest version includes a graphic dump trigger for dumping screens from games whilst they are running.
Two commands are used to operate the dump routines:
*GIMAGE – This provides a full graphics dump of any graphics mode, plus modes 7 and '8'. There are many optional parameters but you need only specify the parameters you wish to change.

Features available include:

- Vertical and horizontal scaling through all the graphic modes and mode 7
- Rotation of the image produced through 90, 180 and 270 degrees
- Left hand indentation setting
- Screen dump window definition
- Colour grey scaling
- Two tone fast dump
- Special colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered dumps
- User port switched dumps

What does the independent press say!

Practical Electronics, May 1985
"The Dump Out 3 ROM from Watford Electronics represents one of the most sophisticated types of printer dump utilities available for the BBC Micro . . .".

"an extremely sophisticated and powerful dump utility".

"VERDICT – Dump Out 3 ROM has all the facilities which you are ever likely to need for producing printer dumps. The facilities available work extremely well and if printer dumps are something which you require, then this ROM can be recommended to help you to get the best out of your dot matrix printer".

The Micro User Feb. 1985.
"Well, here is that winner"!

"provide(s) some rather sophisticated screen dumps. Producing high resolution paper copies of graphic screens in any (graphics) mode will be the major reason for buying this ROM, and this is where Dump Out 3 performs PAR EXCELLENCE". (Our capitals for their italics.)

"The versatility of *GIMAGE (the graphics dump command) when using these parameters is amazing. Pictures of almost any size, shape, contrast or distortion may be produced without the need for a reducing photocopier or trick photography".

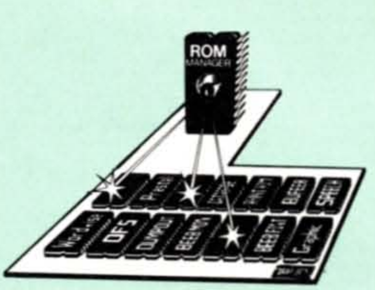
"Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC micro. It is easy to use yet highly versatile, and caters for all BBC screen modes in multitone high resolution printing. Whole, partial, rotated and scaled screens may be dumped to almost any BBC compatible dot matrix printer (see our list at the end of this advert). At £25 it must represent excellent value for money and surely cannot be beaten".

Designed for use with the following printers:

CP80, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, LPVII, NEC PC8023, DMP100/200/400, Mannesman Tally etc.
Price including comprehensive manual

£25

ROM MANAGER



Probably the most powerful way of expanding the BBC micro is from the use of Sideways ROMs. One problem faced by the avid ROM collector is that of ROM command clashes. The solution is very simple in the form of the ROM that "Provides comprehensive management of all your installed ROMs". (Quote from BEEBUG November '84.)

Basically, ROM Manager offers you the ability to turn off any installed ROM, or to send any * command to any specific installed ROM. It is said that imitation is the sincerest form of flattery – Acorn's BBC Plus features many of the abilities of this powerful ROM.

Many more facilities available.

SPECIAL OFFER £18

BEEBFONT ROM

BEEBFONT is a remarkable and different concept in BBC software. It allows you to display text on the screen in 13 different styles. It is supplied complete with a Spooler and Editor on 40 or 80 track disc.
(Please write in for technical details).

ONLY **£25**

BEEB PRINTER ROM

"Makes Printing Childs Play"

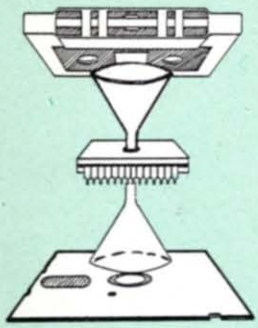
This utility ROM is designed to simplify using all the facilities of your printer. It has many facilities:

★ Selection of printer modes such as underline, font and size is by 'Single Key' operations.
★ From Wordwise, a single number following OC will select a mode rather than a long and incomprehensible string of control codes. This makes using your printer with Wordwise much more convenient.
★ When using Basic (or other languages) you can have control over the formatting of the output to the printer in the style of a wordprocessor. You can define page top, bottom and side margins etc. with intelligent page skip for binders an option. All supported printers will now respond to form-feed etc. commands.
★ User defined characters are printed as you see them on the screen so that non-standard characters are automatically printed out correctly.
★ Commands select the options for the following printers:
GP100, STAR, NEC, MX/FX, KAGA, LP/VII/DMP100, DMP200.
Operates with either parallel or serial interfaces.
★ Supplied with a 50 page manual that is very comprehensive and easy to follow. Please specify printer type when ordering so that we can send the correct function key strip.

Price: £25

TRANSFEROM

(Tape to Disc Utility)



The only TAPE to DISC Utility ROM that works with our Double Density Disc Interface.

This advanced and sophisticated utility ROM for the BBC Micro has the following features:

- Fully menu driven for ease of use
- Copes with locked programs
- A very comprehensive built in copying features
- Copies very long adventure games
- Supplied with comprehensive manual

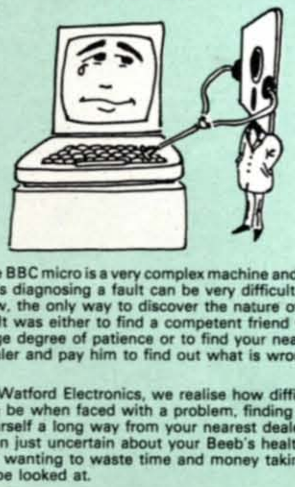
TRANSFEROM is now available in BOTH single and double density versions. The single density version works with both the Acorn and Watford single density DFSs. The double density version works with the Watford DDFS system only.

TRANSFEROM takes your software on tape and saves them onto disc. TRANSFEROM does not stop when one disc is full; you just insert another disc in and carry on with that one! Surely this is the most valuable investment you could make if you have tape software that you wish to transfer to disc! Please specify version required – Single or Double Density.

£25.00

All prices exclusive of VAT

DIAGNOSTICS DISC



The BBC micro is a very complex machine and thus diagnosing a fault can be very difficult. Until now, the only way to discover the nature of a fault was either to find a competent friend with a large degree of patience or to find your nearest dealer and pay him to find out what is wrong.

At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

Continued

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

ROMAS

THE CROSS ASSEMBLER AND MACRO EDITOR FOR SERIOUS PROGRAMMERS!

ND
6502
HEX
)(
?
REM
ASM
CHR$
FAL
LD
Z80

ROMAS is a carefully designed, sophisticated yet simple to use, development system for serious assembly language programmers. Using the BBC as the development system, you can choose your target system from the following processors:

6502, 65C02, Z80, 8085, 8041, 6809 and Z8 P.S. This includes the Acorn 6502 & Z80.

ROMAS features a powerful expression analyser, making complex table easy to generate. To aid in documentation, fully formatted assembly listings may be produced, with full symbol table output at the end.

ROMAS is provided with a powerful cross referancer to produce a listing of all the labels in a given "source" program; this makes it easy to check to see if you are about to duplicate a label.

The Macro Editor

Features of this powerful editor provided with the ROMAS package include:

- Works in all 40 and 80 column screen modes
- Fast load and save speeds
- Continuous line and column number displays
- Search, replace and move; all available in macros
- Command repetition

The ROMAS package includes a comprehensive manual, providing detailed documentation and plenty of examples.

A give away at . . . **Only £45**

Please specify 40 or 80 track disc when ordering.

ADE

'Systems' complete program development package in a 16K ROM. We are now supplying the new 6502 2nd processor compatible version.

SPECIAL OFFER ONLY **£34**

ULTRACALC 2

The mark 2 version of the BBC Publications' extremely popular electronic spreadsheet ROM.

Only: **£66**

THE INVESTIGATOR

This sophisticated Utility program on disc, enables you to make security back-up copies of most of your valuable Disc Software. Makes full use of all 8271 (will not run with double density DFSs) facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

Only **£20**

ROM-SPELL

"way ahead of any competition"

ENGLISH DICTIONARY
ROMSPELL

ROM-SPELL is probably THE most advanced and fastest spelling checker available for the BBC Micro. Printed below are some extracts from a recent independent review (A&B Computing Nov. '85), which we feel sure will convince you that this is THE only spelling checker worth considering.

"The editing system is very neat and simple, instead of replying to queries and beeps all of the time . . ."

"The other feature which places ROM-SPELL way in front of any competition is the ability to examine the user dictionary, so any spelling mistakes that have found themselves on the disc can be examined and taken out if necessary".

". . . that it is compatible with many of the popular word processors on the market is a good indication that ROM-SPELL is going to be a very popular product indeed".

". . . ROM-SPELL is by far the best spelling checker for the unexpanded BBC B (with or without word processor). It boasts features which are hard to find on conventional spellcheckers on CP/M and MSDOS, namely Spellstar and has a speed/performance ratio of roughly the same as its CP/M cousin. The difference is that the CP/M version would cost the best part of £500".

". . . and with such vital house keeping features as an ambiguous word checker, the ability to edit the user dictionary, a comprehensive manual that is both easy to read and actually ENJOYABLE to learn from, . . . I feel confident that ROM-SPELL will woo the word processing public with no problems at all".

Don't settle for less, Buy the best.

ROM-SPELL costs only **£25**

(Please state 40 or 80 track disc)

DISC EXECUTOR

Disc Executor is a sophisticated disc utility for the transfer of your programs from cassette to disc. It copes with 'locked' files and full length adventures (up to &6E blocks long) and programs that load below &E00. Disc Executor is simple to use and provides menus to prompt the user along the way. Disc Executor will cope with the vast majority of tapes. (Please note that Disc Executor is not compatible with double density disc interfaces – keep reading our adverts though!)

Price only **£10** (40 or 80 track)

BEEBMON

BEEBMON is the most powerful and versatile machine code monitor from Watford Electronics. BEEBMON offers some superb features specially designed to make the task of understanding and debugging machine code easier; indeed BEEBMON is probably the only product with sufficient power to aid in the debugging of such complex pieces of software as a DFS.

Offering a total emulation mode, BEEBMON can be used to single step through code anywhere in memory. All breakpoints are emulated and the workspace is totally relocatable, allowing for the simulation of all those "awkward" pieces of code.

(Write in for technical details.)

£24

DISASSEMBLER ROM

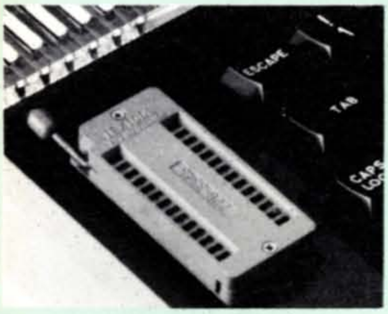
Discover the hidden secrets of BASIC and the OPERATING SYSTEM with this easy to use progammers tool.

Please write in for technical details.

ONLY **£16**

Continued →

SIDEWAYS ZIF SOCKET



Now Watford Electronics brings you a ROM board for small budgets or for those of you who do not wish to open up your Micro frequently. It allows you to change ROMs quickly and efficiently with the minimum of effort – no screws to loosen or keyboard to remove. The unit consists mainly of a zero insertion force (ZIF) socket on a small circuit board which is located into the position of the 'ROM Cartridge' and is connected to one of the internal ROM sockets via a ribbon cable.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.

- The low profile of the socket allows unrestricted access to the keyboard, unlike other cartridge systems. In addition, there are no costly extras, such as ROM cartridges for every new ROM.

- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

- This versatile hardware solves the problem of running out of socket space, simply unplug the ROM and plug in a different one. It is a real must for Professionals and Hobbyists alike.

ONLY **£15** (carr £2)

16K Sideways RAM Modules

This is it! The revolutionary design RAM Module you've been waiting for. Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

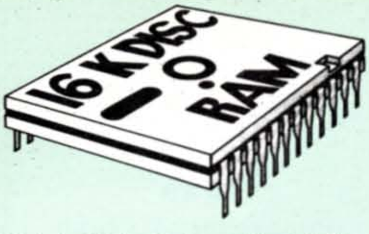
- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Works with any ROM.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional extras

READ and WRITE protect Switches	**£2** each
Battery for Battery Backup	**£3**

All prices exclusive of VAT



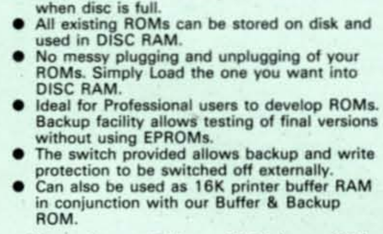
This is the RAM you've been waiting for!! This battery backed up, write protectable 16K sideways RAM board allows you to run from disk every sideways ROM available. Beware of other sideways RAM boards which are not backed up as certain ROMs will not run in these boards even though the RAM can be write protected. The Battery Backup facility allows retention of DATA after power off. On switch on the Micro will think the WATFORD DISC RAM is a ROM. Features available are:

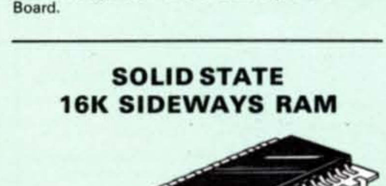
- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- All existing ROMs can be stored on disk and used in DISC RAM.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM in conjunction with our Buffer & Backup ROM.

New Low Price: £30 (carr £2)

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

SOLID STATE 16K SIDEWAYS RAM

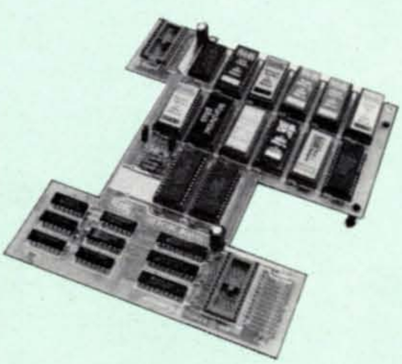




This new unit from Watford, which utilises the latest in Static RAM technology, offers 16k of easy-fit sideways RAM in a very compact unit with a footprint no larger than a standard 28pin EPROM. With only a single flying lead to fit, (no soldering required) this compact unit works with any BBC Micro with or without a ROM board. Compatible with BBC B Plus. Like our other 16K RAM Modules, this unit is very simple to fit.

Only **£28** (carr 2)
Supplied complete with comprehensive software on Disc, Operating and fitting instructions.

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16. Also permissable, are various configurations of RAM (up to 16k) and different sized EPROMs (see below).

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 can take the following chips: 2716, 2732, 2764, 27128, 6116, 6264.
- Auto write protect for RAM chips.
- Read protect to make RAM "Vanish"; allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£36**
(carriage £2)

EXTERNAL Sideways ROM BOARD

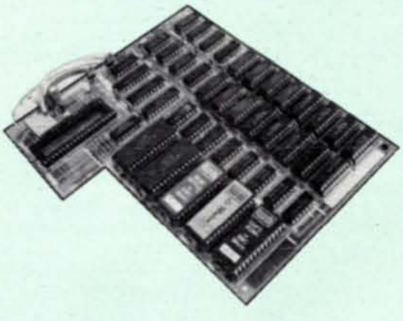
This extremely versatile 12 ROM Socket Board is supplied with power supply, boxed in an attractively finished BBC beige. A second board can be fitted at a later stage to give a total capability of 28 ROMs.

- No soldering required.
- Easy access to ROMs.
- Does not physically interfere with other internal add on boards.
- Built in power supply.
- Write protect for RAM.
- Allows upto 32K Static RAM and 24 ROM Sockets in varied combination.

Price: **£75** (carr **£3**)
(2nd Add-on Board **£30**)

Watford ROM/RAM CARD

A must for all serious users



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with ALL BBC micros (not BBC Plus).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Write protect for ALL RAM.
- Master write protect for all sockets.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Can run ANY BBC ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM/RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM/RAM Board.

The ROM/RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, should the user wish to upgrade in the future. Please write in for further details.

INTRODUCTORY PRICES:

● *ROM/RAM card with 32k dynamic RAM*	*£45*
● *ROM/RAM card with 64k dynamic RAM*	*£69*
● *ROM/RAM card with a massive 128k dynamic RAM*	*£109*

(carriage on ROM/RAM Card £3)

OPTIONAL EXTRAS:

● *16k plug-in Static RAM kit*	*£7*
● *Battery backup*	*£3*
● *Read and Write protect switches*	*£2 each*
Complete ROM/RAM board (all options installed)	*£125*

Le Modem

PROHIBITED from direct or indirect connection to any telecommunication system run by British Telecommunications. Action may be taken against anyone so connecting this apparatus

The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World/wide data transfer system.*
- *Auto Dials, Auto Answers, Auto Baud selects and is completely controlled by your Micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELESOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple *COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON/OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*

- *BT Approval applied for.*

Price: **£89** (carr £3)

(Price includes Software ROM, Cables and Manual)

Nightingale Modem

SPECIAL PRICE to our Customers

£119

(Price includes COMMSTAR ROM & comprehensive manuals)

Nightingale Modem without software	**Only £99**
COMMSTAR ROM package only (P&P on modem £2.00)	£29
Auto Dial/Auto Answer Board	£48
Auto Dial Utilities Disc	£9.50
OBBS Bulletin Software	£20.00

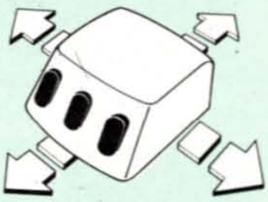
LOGOTRON LOGO

The popular Logotron Logo in ROM. Recommended by most Education authorities.

Only: £55

THE AMX MOUSE

The AMX Mouse needs no introduction. It is simply the best.



Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.

ONLY: £65

(carriage £1.50)

We are giving away the sophisticated **COLOUR ART** Software package **ABSOLUTELY FREE** with every purchase of the AMX Mouse from us.

AMX DESK Package	**£19.00**
AMX UTILITY Package	**£11.50**
AMX SUPERART Package	**£43**
AMX PAGE-MAKER Pack	**£43**
AMX 3D ZICON Disc	**£21**
AMX Database Disc	**£21**
AMX XAM Educational	**£21**

COLOUR ART

This novel program allows you to add COLOUR to any drawing produced with your AMX Mouse package, and really brings those pictures alive. Not with just any colours, mind you, but a full range from up to 255 different shades! It's simplicity itself to use this "painting by numbers" painter to create simple, striking and powerful images to please the eye.

Price **£10**

(please specify 40 or 80 track disc when ordering)

Versatile **BEEB SPEECH SYNTHESISER** Unit

The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

Continued →

COMPUTER CONCEPT'S ROMS

ACCELERATOR	**£52**
CARETAKER Basic Utility	**£27**
Graphics ROM	**£26**
Disc Doctor ROM	**£26**
TERMI	**£27**
COMMUNICATOR	**£58**
SPEECH ROM	**£26**

Wordwise

The most popular Wordprocessor for the BBC Micro.

Special Offer: **£32**

Wordwise plus

£45

FREE FREE FREE

We are giving away absolutely FREE, the superb Word-Aid ROM worth £20, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text/segment area.

Only **£20**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS

Supplied on disc. This version requires a WORDWISE-PLUS ROM to be present in the machine. It gives up to 44k of text space on the 6502 2nd processor.

£5

Inter SHEET

The most powerful spreadsheet package available for the BBC Micro. Ultra-fast replication and calculation times help make this the easiest to use. It has received very favourable reviews. Unique 105 column screen mode. Supplied in 2 ROMs.

£45

INTER CHART

This unique program is the only one of its sort on the market. Accepts data from a variety of sources and plots line graphs, bar charts or pie charts. Up to 16 separate charts may be stored in memory. Built in screen dump for EPSON compatible printers, but can use other printer dump routines.

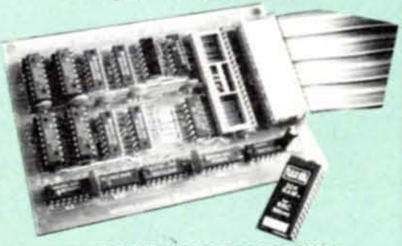
ONLY: £30

GRAPH PAD

With this popular Mk II British Micro's Graph Pad, you can add new dimensions to your computer enjoyment. It helps you to create your own applications programs by the simple use of the Graphpad. Ideal for educational use. Supplied complete with cables, Manual and Software Cassette.

Special Offer £51 (carr £3)

32K
SHADOW RAM-Printer Buffer
Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

- "VIEW" Wordprocessor users can now type in text in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This superb product is recommended by Computer Concepts for use with both Wordwise and Wordwise Plus. We wholeheartedly agree with this commendation.

- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.

- Use 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Only a 12K printer buffer can be used in Wordwise or Wordwise Plus due to the way in which they are written. Print large text files while running long graphics programs and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Only 12K Buffer can be used in Wordwise or Wordwise + because of the way these softwares are written.

- Ensure COMPATIBILITY with a vast range of hardware (including Watford & ATPL ROM boards, double density boards, second processors), and software (including BASIC, TOOLKIT, VIEW, WORDWISE (1.20+), WORDWISE-PLUS). This is because our board, unlike those of our competitors, is connected to the computer by a ribbon cable.

- Achieve EASY OPERATION with ROM based software. A large range of commands is available for machine code and BASIC users, including some useful *HELP messages.

Only: £59 (carr £2)

(Price includes a comprehensive manual and the ROM)

INCREDIBLE WORD PROCESSING DEAL ! ! !

Watford Electronics, already renowned for quality products at discount prices, are offering, for a limited period only, the truly spectacular BARGAIN OF THE YEAR!

A Watford's 32K RAM Card (offering printer buffering and shadow screen RAM facilities) with the well known WORDWISE PLUS Word processor.

32K Shadow RAM Card/Printer Buffer and Wordwise Plus (a very powerful package) for the absolutely astounding price of:

Only £69 (carr £2)

(P.S. For an extra £14, we will include Word-Aid ROM package for the Wordwise Plus, if bought at the same time.)

VIEW

VIEW WORDPROCESSOR 2.1 .... **£39**

VIEW 3.0 ROM

This latest version features automatic relocation with a 6502 second processor and takes full advantage of any shadow memory fitted. BBC B Plus compatible. Supplied complete with Printer Driver Generator tape.

Price: Only **£60**

HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

£49

VIEWSHEET (Acornsoft)	**£39**
VIEWSTORE	**£39**

Watford's own Sophisticated VIEW PRINTER DRIVER for Epson FX80 & KAGA KP

Only £10

VIEW DRIVERS FOR JUKI & BROTHER PRINTERS

Only £10

VIEW/VIEW SHEET PRINTER DRIVER for SILVER REED

(Officially approved by Silver Reed)

Only: £10

ISLAND LOGIC MUSIC SYSTEM £25

Viglen Console Unit

Enhance the appearance and convenience of your BBC Micro with the Viglen console unit.

£42

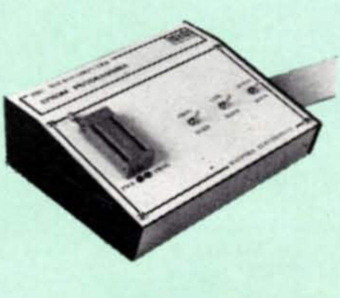
GLENTOP's 3D GRAPHICS

Development System **£22**

BOOKS (No VAT on Books)

21 Games for the BBC Micro	£5.95
30 Hour BASIC (BBC Micro)	£7.95
40 Educational Games for the BBC Micro	£5.95
6502 Assembly Language Program	£19.95
6502 Application	£11.95
6502 Assembly Language Subroutines	£19.95
6502 Machine code for Humans	£7.95
6502 Development System	£7.50
68000 Assembly Lang. Programming	£19.95
Advanced Disc User Guide	£14.95
Advanced BASIC ROM User Guide	£9.95
Advanced Machine Code Technique for BBC	£7.95
Advanced Programming for the BBC Micro	£6.95
Advanced User Guide for BBC Micro	£11.95
Advanced Graphics with BBC	£9.95
Assembly Language Programming on BBC Micro	£7.95
Advanced Programming Techniques for the BBC Micro	£8.95
Applied Assembly Lang. for BBC	£7.95
Assembler Routines for the 6502	£7.95
Assembly Language Programming FOR the BBC Micro	£8.95
Assembly Programming made Easy	£5.95
Basic ROM User Guide	£11.95
Basic User Guide for BBC Micro	£10.00
BBC BASIC	£5.95
BBC Forth	£7.50
BBC Machine Code Portfolio	£7.95
BBC Micro add on guide	£7.95
BBC Micro Advanced Reference Guide	£10.95
BBC Micro Advanced Programming	£9.95
BBC Micro Book BASIC Sound & Graphics	£7.95
BBC Micro Graphics and Sound	£6.95
BBC Micro ROM Book	£9.95
BBC Micro **ROM PAGING** System Explained	£2.00
BBC Micro Disc Companion	£7.95
BBC User Guide	£10.00
BBC Wargaming	£8.95
BCPL User Guide	£14
Brain teasers for BBC micro	£5.95
Business Applications on BBC	£7.95
CP/M Bible	£16.00
CP/M Handbook with MPM	£9.95
CP/M Soul of	£14.95
CP/M The software BUS	£8.95
Creative Animation & Graphics	£7.95
Creative graphics on BBC Micro	£7.50
Creative Sound	£9.95
Disc Drive Projects for Micros	£5.45
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
Disc Programming Techniques	£7.95
Discovering BBC Micro Machine Code	£6.95
Exploring FORTH	£6.95
Filing System & Databases for the BBC Micro	£7.95
Further Prog. for BBC Micro	£5.95
FORTH on the BBC Micro	£7.50
Functional Forth for the BBC Micro	£5.95
Games BBC Computer Play	£6.95
Graphics for Children	£6.95
Graphs & Charts on BBC Micro	£7.50
Guide to BBC ROM	£9.95
Hackers Handbook	£4.95
Handbook of Procedure & Functions for the BBC Micro	£6.95
Into View	£4.50
Introduction to COMAL	£9.50
Introduction to LOGO	£6.95
Introducing CP/M on the BBC Micro Z80 2nd Processor	£9.95
Introducing LOGO	£5.95
Introduction to FORTH	£8.95
Introduction to PASCAL	£16.50
ISO -PASCAL Reference Manual	£9.95
Let your BBC teach u to program	£5.45
LISP	£11.95
LISP, A Beginners Guide to	£10.95
LISP Cassette	£15.50
LISP on the BBC Micro	£7.50
Logo Programming	£8.95
Mysteries of DISC DRIVES and DFS REVEALED	**£5.95**
Mastering CP/M	£16.50
Micronet Handbook	£6.95
Programming the 6502	£13.95
Programming the BBC micro	£6.95
Programming the Z80	£16.95
S-PASCAL on BBC Micro	£7.50
Structured Prog. with BBC BASIC	£6.50
Termulator Manual	£4.95
The Complete FORTH	£6.95
The Complete Programmer	£5.95
The Epson FX/KAGA PRINTER Commands REVEALED	**£5.95**
Turtle Graphics on BBC Micro	£7.50
Using Floppy Discs with BBC Micro	£5.95
View Guide	£4.50
Viewsheet User Guide	£10
Using BBC Basic	£6.95
Wordstar & CP/M made easy	£7.45
Z8000 Assembly Language Programming	£18

EPROM PROGRAMMER



The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed – wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

SOFTWARE PACKAGE
The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette/disc loading). It is a fully purpose designed and ingegrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

Software facilities include:
Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.
Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

SPECIAL OFFER £69
(£3 carr.)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
- **ERASER GT** – Deluxe version erases up to 28 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30** (carr £2)
- Spare UV tubes. **£9**

BEEB VIDEO DIGITISER

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROM's to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Features offered by this package include:

- The adding of pictures or written text to typed documents.
- Unattended recording of scientific data.
- Entry of real images into graphics programs.
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- Up to 8 grey levels
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Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£99 (Carr. £3)

(Price includes: Digitiser Unit, ROM & a comprehensive Manual.)

Magazine Maker

A combination of the AMX Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within AMX Pagemaker to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Pagemaker's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Pagemaker's graphics option to produce any number of effects.

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Continued →

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L.B.O.

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- Sorting of appointments by date and time of day.
- Month AND week's summary at a glance, indicating time booked and free.
- Single entry of a RANGE of events and updating of regular happenings.
- Super search facility to call any event by any related word or part word.
- Month by month preview of all forthcoming events.
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- Easy to follow documentation.

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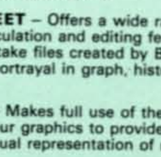

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النور

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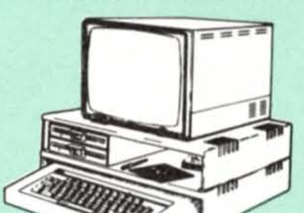

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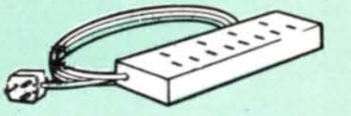

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B/E = BBC/Electron

See us on Prestel – Page 60043754

Now for some prompt action

PETE BIBBY explores the ins and outs of INPUT in Part 4 of our guide for beginners

BEFORE we plough on with our simple guide to the subtleties of BBC Basic let's have a look at what we've done so far. By now you should have a grasp of the Basic keywords PRINT, LET, LIST, CLS and RUN.

Notice how some can be used immediately as in:

```
PRINT "command mode"
```

while others, such as RUN, need a program to work on.

You should also have an understanding of variables, know the difference between a numeric and a string, the rules for naming them and how to use them. So:

```
LET first=1
LET second=2
LET result$="The total is "
LET sum=first + second
PRINT result$;sum
```

should make sense to you.

Finally we saw how to make simple programs that are obeyed one line after another. Program I is such a program.

```
10 REM Program I
20 PRINT "Enter length"
30 INPUT length
40 PRINT "Enter width"
50 INPUT width
60 area=length*width
70 REM Look no LET
80 PRINT "The area is ";area
```

Program I

One thing you'll notice about it is that while it's fairly familiar there's a new keyword in there. It's the Basic command INPUT, one of the more powerful statements in the Basic language.

It's so rigid

So far you've probably been a bit frustrated by the simplicity of our programs. They have lines like:

```
10 length=5
20 breadth=3
```

which assign values to the variables *length* and *breadth*. The trouble is that no matter how many times you run the program the values of *length* and *breadth* stay obstinately the same. If you want to use different values for the variable you have to enter the lines again.

The point I'm trying to make is that the program is very inflexible. And this is where INPUT comes in.

Flexibility is all

To see what INPUT does, enter:

```
INPUT number
```

and press Return. Unless your micro is very different from mine, you'll be rewarded with a forlorn looking:

```
?
```

on the screen.

That question mark is a prompt, telling you that the micro is waiting for you to type in a number. So give it one, say 12, by typing in:

```
12
```

and pressing Return. As soon as you do this the micro takes the value 12 and stores in the variable name that followed the INPUT. In this case the variable name is *number,* so after you reply to the prompt *number* holds 12. You'll see this if you now use:

```
PRINT number
```

Now this isn't all that impressive, is it? After all you could have got the same effect with:

```
number=12
```

without the bother of using INPUT or having to reply to the prompt. It's a good point. However when it's used in a program, INPUT comes into its own as you'll see if you run Program II.

```
10 REM Program II
20 INPUT number
30 PRINT number
40 PRINT number*2
```

Program II

When you give the micro the RUN command, it goes to the lowest line number and starts to work. It ignores everything after the REM of line 10 and goes on to line 20. Here it meets the INPUT command, followed by the variable name *number.* Once again you're rewarded with the question mark as the micro waits for you to type in a number and press Return.

In other words the program halts until you give it some input. Put the poor thing out of its misery with, say, 2 and the program springs to life again putting:

```
2
4
```

on the screen.

Now run the program again and this time try other numbers. You can run the program over and over again. Each time the micro does the same thing but does it to different numbers. And that's the flexibility allowed by INPUT. It lets you write a program in general terms, and gives it values to work with when it is run.

Give us a clue

Having sung the praises of Program II's flexibility, let me now criticise it. The bit I don't like is the question mark. It asks for information but doesn't tell you what information it wants. As we'll see later a program can ask for lots of inputs. This can result in a lot of meaningless question marks scattered across the screen. To use the jargon, it's not very user-friendly.

However this is easily resolved by using PRINT to give a hint as to what's

→

From Page 49

expected. Program III shows what's meant.

```
10 REM Program III
20 PRINT "Please give me a number"
30 INPUT number
40 PRINT number
50 PRINT number*2
```

Program III

In a short program like this labelling inputs may seem a bit silly, but as you get on to longer programs you'll find that it's good practice.

Now suppose you respond to Program III's prompt with:

```
two
```

Can you guess the result? The micro doesn't know what you mean so it "fails safe" and gives *number* the value zero.

Strings as well

So far we've only had numeric variables after the INPUT. Enquiring readers will have asked themselves if you can use INPUT with string variables. The answer is yes, as Program IV shows:

```
10 REM Program IV
20 PRINT "What is your name?"
30 INPUT name$
40 PRINT "Hi there, "name$
```

Program IV

Here the program waits at the INPUT of line 30 until the user responds. It then takes what is typed in and uses it in the last line to say hello.

So if I type in:

```
Pete
```

in answer to the prompt I get rewarded with:

```
Hi there, Pete
```

Notice that we don't have to surround the input string with inverted commas as we did with LET. The micro takes it for granted. Can you guess what will happen if you type in a number such as 45 in response to the prompt?

Doing two things at once

You're not limited to having just one variable to an INPUT. You can have two or more so long as they are separated by a comma. Program V shows how it works.

```
   10 REM Program V
   20 PRINT "Please give me two numbe
rs"
   30 INPUT first,second
   40 PRINT first,second
```

Program V

When you run this, the program gets the line 30 and waits for a response from the keyboard. It knows that it has to get two values and put them in the variables first and second.

There are two ways you can satisfy the program. Suppose the values you want to enter are 2 and 3. You can enter 2 in response to the first question mark, then 3 to satisfy the next question mark that appears. Alternatively you can do both at once by entering:

```
2,3
```

and pressing Return.

Notice that the first number you input is given to the first variable after the INPUT, the next to the second. You can add more vaiables to the list if you want but it gets fraught with difficulty as the user makes mistakes or forgets which variable comes first. I prefer one prompt to one INPUT. It may take a lot of lines but it does save confusion!

More on messages

You don't always have to use a PRINT statement to give a prompt. You can, if you want, put the message in inverted commas between the INPUT and the variable. Try:

```
INPUT "Any message" message$
```

and you'll see:

```
Any message
```

appear on the screen as a prompt. Notice that there is now no question mark. Also, when you type in your input it appears right next to the message – which appears a bit cluttered. It's better to have a space before the final inverted commas of the message, as:

```
INPUT "Give me room " message$
```

will demonstrate as you respond to its urging.

If you miss the question mark and want it back you can always retrieve it by putting a comma before the variable name, as:

```
INPUT "Any message",message$
```

shows.

How you decide to prompt for your inputs I leave to you. Myself, I prefer to use a separate PRINT as it makes the listings appear less cluttered.

In(put) conclusion

I hope that by now you'll have got some idea of how flexible INPUT makes a program and understand how Program I works. Have a look at Program VI which calculates the mean of two numbers.

```
   10 REM Program VI
   20 PRINT "Please give me two numbe
rs"
   30 INPUT first,second
   40 meanAverage=(first+second)/2
   50 PRINT meanAverage
```

Program VI

You shouldn't have any difficulty figuring out how it works. But notice how flexible it is. You can run the same program over and over again with different numbers. You don't have to change a thing in the program itself, just respond to the prompts.

● *I'll leave you to explore the flexibility of INPUT in your own programs until next time when we'll be looking at more Basic keywords.*

PROBLEM

I HAVE come across a serious problem on my BBC B. On switching on the micro makes one beep, the caps lock and shift lock come on, the screen clears and Mode 3 or 0 is set.

Then the computer will accept no input from the keyboard – or, obviously, the recorder. Even Ctrl + Break does not work. – K. Crisp, Bordon.

SOLVED

The fault is a loose connection between the keyboard and the main board. Try inspecting it closely, or removing and replacing it.

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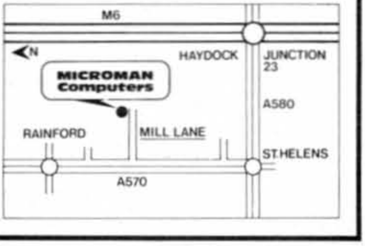

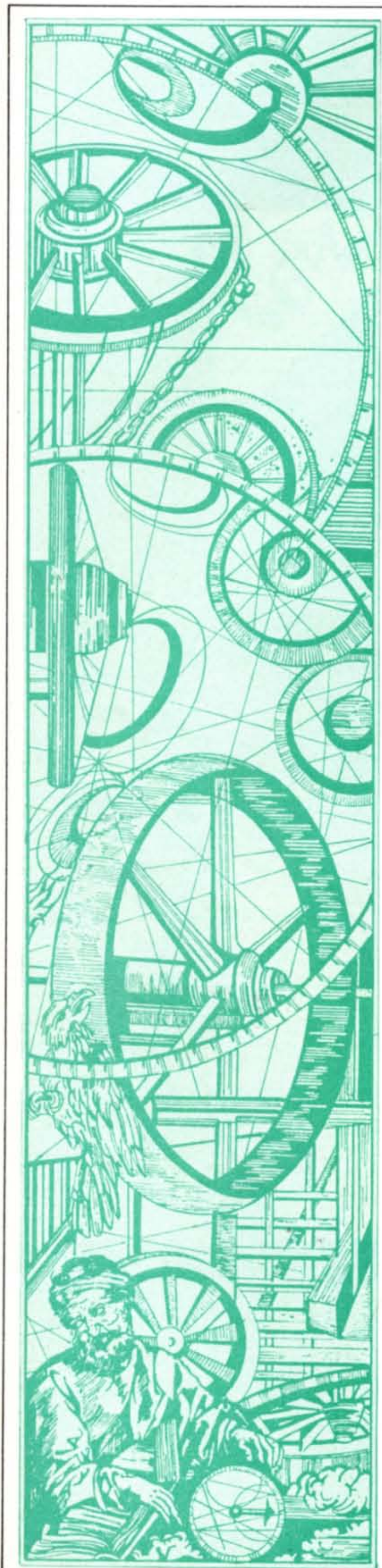

Alice considers ways of making and breaking codes and combinational problems

Wheels within wheels

ONE of the appeals of an adventure is that the computer appears to understand you. This Apparent Intelligence, usually called AI, is being developed in far more serious ways to produce the so-called fifth generation of Machine Intelligence – the "Star Wars" era when machines will, and will have to, make life or death decisions.

But the appeal of a logical – hence correct thinking – machine has a long history. The first one was invented about 700 years ago on the island of Majorca by Ramon Lull, a Spanish theologian. His machine was simply a set of concentric wheels with "information" written round the edge. It now seems rather ridiculous to many people but actually his "wheels within wheels" is the very basis of encryption devices such as those used during the Second World War.

It is a strange paradox that his method should be used successfully to hide information rather than reveal it. Nevertheless, because such machines can generate a fantastic number of possibilities in a fixed order they are both essentially pseudo-random number generators – the fundamental basis of all modern encode/decode machines.

To give you just a taste of how such machines work I have written an Enigma type coding program (see Program I) which requires you to seed the BBC Micro's random number generator and then type in your message.

As a test try giving it the date as the various seeds (or keys). So 21 March is 210386 and the message "AAAAA" then becomes "EBYZR". Note that a different key will give a different result. For example 220386 turns "AAAAA" into "WNJNN" – another (consistent) mix of letters.

```
10 INPUT"SEED";X
20 R=RND(-X)
30 INPUT"MESSAGE";M$
40 FOR I=1 TO LEN(M$)
50 C=ASC(MID$(M$,I,1))+RND(26)
60 IF C>90 THEN C=C-26
70 PRINT CHR$(C);
80 NEXT I
90 PRINT:GOTO 10
```

Program I

If you keep your messages short and choose a rather more complex seed rule then it is practically impossible for anyone to decode the result unless they are told the key.

How to actually decode with the correct key is left as an exercise for the interested user.

Another application of Lull's machines – and again something he could never have imagined – is in the field of statistics when an investigator wants to test all possible combinations in a controlled environment.

A particular biological example might be to test different strains of wheat grown in different soils with different fertilisers and so on.

Lull's machine, if designed correctly, can generate all the required combinations in a fixed and easily defined way.

How to precisely design these combinatorial machines is a very complex subject, but a simple example is one to solve the puzzle of how to keep 15 prisoners, at three to a cell, happy for seven days by making sure they never spend more than one night with each other.

The best solution to this problem was sent in by Norman Purnell of Bristol in the form of a Lull machine, shown in Figure I.

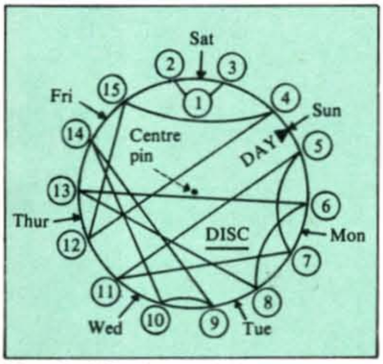

Figure I: A 15 prisoner solution with a Lull machine

It works like this:

1. Turn the disc to DAY → SUNDAY
2. Read off the five triplets, that is the five groups of three numbers linked together by the connected lines thus:
SUNDAY 1, 2, 3 4, 12, 15 5, 7, 11 6, 8, 13 9, 10, 4
3. Turn the disc to DAY → MONDAY and repeat part 2.

As I said some months ago there are actually seven fundamental groups of solutions to this puzzle and Purnell's layout is just one of these. How to discover or generate the other six groups is difficult to describe and the interested reader should consult Chapter 10 of "Mathematical Recreations and Essays" by Ball and Coxeter.

FURTHER SOLUTIONS

NO one solved the Dudeney's 7×7 queen's tour problem from the November issue, probably because I did not make clear that the correct path does not go outside the array. The message hidden in the 49 cells of the array is the 49 character WEYLANDS*SMITHY*AT*NOON*ON*JULY*THE*TWENTY*SECOND obtained via the following 12 queen moves:

1	NE,5	7	E,3
2	S,4	8	SW,3
3	W,5	9	N,4
4	NE,4	10	E,6
5	S,4	11	S,6
6	NW,4	12	W,6

Weylands Smithy is actually an ancient long barrow, or burial place, about one mile west of the famous White Horse Hill near Swindon in Wiltshire.

Pellian equation (December) The smallest integer solution to the equation 61×I×I+1=P×P is I=226, 153, 980 and P=1, 766, 319, 049. Therefore the number of the editor's deposit box in Zurich is 3, 119, 882, 982, 860, 264, 401.

This was first calculated more than 100 years ago, so no excuses that your micro could not cope with such a large number.

Despite their age both the above problems by Dudeney are obviously still difficult to solve so now we come to a more modern and simpler type of problem namely **Derlien's puzzle** (January). The problem set by the program is to use all the digits 1 to 9 once (and once only) to create two numbers A and B such that B= 3×A.

There are two such possibilities: A=5823 B=17469 or A=5832 B=17496 and the correct answer is "hidden in the program" – actually in the superfluous message in line 150. Just count the letters in "THESE CONFOUND ME AND I CONFIRM YOUR MENTAL ABILITIES".

In the two weeks after publication I received 20 "solutions", of which only three refer to line 150 as the correct reason for their answer. These came from T. Hewson of New Milton, J. Warmington of Brighton and D. Bowman of Bedford.

I'm afraid I can't answer Mr Hewson's query that "the real mystery is why do I bother?".

A curious twist is that Peter Derlien did not realise there are two possible answers and cannot decide whether this makes the problem easier or harder. My thanks to everyone who had a go, particularly those who found it "far too easy".

SELF LISTING PROGRAM

IN February I mentioned an amazing program that could print an exact copy of itself and you (hopefully) will have tried to perform this trick. If you failed then try Program II to assure yourself that it is possible. The prize puzzle is to write another "self printer" without using RESTORE or prove that RESTORE is essential.

```
10 DATA B$=" DATA ":@%=5
20 DATA FOR J=10 TO 120 STEP 10
30 DATA READ A$
40 DATA PRINT J;B$;A$
50 DATA IF J=60 B$=" ":RESTORE
60 DATA NEXT J
70 B$=" DATA ":@%=5
80 FOR J=10 TO 120 STEP 10
90 READ A$
100 PRINT J;B$;A$
110 IF J=60 B$=" ":RESTORE
120 NEXT J
```

Program II

From Page 53

THE HYPERSPACE PUZZLE

AS any adventurer knows (outside of a twisty maze) South is the opposite of North, West is the opposite of East and Down will reverse an Up.

But is it possible to move back and forth in the fourth or higher dimensions?

The answer is yes – all you have to do is type in the Hyperspace program (Program III) to get a taste of the tesseract (a four-dimensional cube).

To test it say you want to travel in just two dimensions which only has four "rooms", the corners of a square.

All these can be visited either by typing N, E, S, W or E, N, W, S.

A tougher test is to make one of the many possible tours of all the 16 rooms in the fourth dimension, thus N, E, S, U, N, W, S, 4, N, E, S, D, N, W, S, R.

I forget exactly how many such tours there are around the tesseract but I do recall that there are 906,545,760 different ways of visiting all 32 rooms in the fifth dimension. This fascinating fact was discovered by a computer in 1972.

If the tests work then you can try to move around in the more complex fifth dimension and above. Note that to return from the fourth dimension you only need to type "R" – the program will prompt you. Higher dimensions have the following entries/exits:

Entry	Exit
5	Finish
6	Leave
7	Out
8	Quit
9	Xit
(1)0	Kwit
(1)1	Terminate
(1)2	Belay

There are 4096 rooms in the 12th dimension and all you have to do is write down a simple rule that guarantees that you will visit ALL these rooms once and once only AND return to the starting point of NEU456789012.

Note that if you visit a room twice the program drops you into a pit.

This puzzle is obviously open-ended in that it all depends on what you mean by "simple". Nevertheless there is a rule that can be stated in fewer than 20 words which I shall give next time.

In the meantime just finding ANY rule should improve the shining hour for those of you that bother. A hint is the Gray Code solution for the Tower of Hanoi, published in the August 1972 edition of Scientific American magazine.

```
  10 DIM A(4096),DIR$(12,1),D(12)
  20 INPUT"NUMBER OF DIMENSIONS ";DM
  30 FOR Y=1 TO DM
  40 D(Y)=0
  50 FOR X=0 TO 1
  60 READ DIR$(Y,X)
  70 NEXT X
  80 NEXT Y
  90 DATA N,S,E,W,U,D
 100 DATA 4,R,5,F,6,L
 110 DATA 7,O,8,Q,9,X
 120 DATA 0,K,1,T,2,B
 130 C$=""
 140 FOR I=1 TO DM
 150 C$=C$+DIR$(I,D(I))
 160 NEXT I
 170 PRINTC$
 180 INPUT "CHOOSE ",A$
 190 I=INSTR(C$,A$)
 200 IF I=0 THEN 180
 210 IF D(I)=0 THEN D(I)=1 ELSE D(I)
=0
  220 R=0
  230 M=1
  240 FOR I=1 TO DM
  250 R=R+D(I)*M
  260 M=M*2
  270 NEXT I
  280 IF R=0 THEN 320 :REM GOT BACK T
O START
  290 IF A(R)>0 THEN PRINT "YOU FELL
INTO A PIT":STOP
  300 A(R)=1
  310 GOTO 130
  320 FOR I=1 TO 2^DM
  330 R=R+A(I)
  340 NEXT I
  350 PRINT"YOU MISSED ";2^DM-R-1;" R
OOMS"
  360 IF 2^DM=R+1 THEN PRINT"ALL DONE
 - WELL DONE"
```

Program III: The hyperspace adventure

Multi-Basic: the next best thing to multi-tasking

By JIM NOTMAN

MULTI-TASKING is a feature usually found on larger and more complex computers than the BBC Micro. It allows more than one program to be run at the same time.

This is achieved by quickly switching between different programs, so that each appears to be running normally without interruption.

While full multi-tasking is not possible on the BBC Micro, Multi-Basic gives a very good approximation. The software is supplied on a 16k paged ROM for fitting in addition to BBC Basic.

A Basic program which is running normally is described as the foreground task. MultiBasic controls background tasks. These are short Basic routines which are switched in and out when required.

The background tasks can interrupt the foreground program, but after completing their task allow the foreground program to continue as if there had been no interruption.

These ideas will not be new to machine code programmers. They know that the operating system is regularly interrupting Basic to carry out a variety of actions, from incrementing the internal timer every centisecond to acting when a key has been pressed.

Tasks are defined in a similar way to procedures. Instead of DEF PROC, TASK shows the start of a routine. Similarly EXIT must be placed at the end of the routine. For example:

```
100 TASK time
110   PRINT TAB(30,0)"        ";
120   PRINT TAB(30,0);TIME
130 EXIT
```

This task will print TIME in the top of the screen every time it is called.

The tasks can be enabled in one of two ways. In the first they can be called at regular intervals. With:

```
ENABLE time EVERY 100cs
```

the task called *time* will be called every 100 centiseconds.

The other way is to check a location in memory, for example:

```
ENABLE key WHENEVER evnt%
```

This time the task called *key* is called whenever a condition specified in *evnt%* is TRUE. The four bytes of the integer variable combine to define the condition being tested for.

This condition looks quite complicated at first, as it must contain the address (two bytes) that is to be looked at, a byte giving a bit pattern that it must look for and a byte which allows individual bits to be inverted before being tested.

The latter of these is very useful because many of the devices which connect to the user port use inverse logic.

Enabled tasks are checked to see if they should be run every centisecond. For most control purposes this response time is fast enough.

Before MultiBasic was available you would have had to write control functions like these in machine code, never a straightforward job. Now these complex interrupts can easily be written in Basic.

A task will not interrupt Basic in the middle of a Basic statement and will not interrupt another active task. A list of currently defined tasks is kept, up to a maximum of eight. There are commands to remove tasks from the list and install new ones as well as testing which are enabled.

To improve timing capabilities, five system timers are provided. They are incremented every one hundredth of a second. It is possible to use them as alarm clocks when programmed with ENABLE WHENEVER commands.

Apart from multi-tasking, the software is well suited for handling the versatile interface adapters (VIA). It is particularly strong at manipulating bits. To make life a little easier, it has its own set of mnemonics for the different VIA registers.

CMS also produces specialised

→

PROBLEM

I OWN a one year old BBC model B. My problem is that when I try to load Castle Quest, Fortress and Phantom they all load correctly until the final sections of each program, then I only get the searching message and any graphics from the previous sections.

I have tried three different tape players, altering the head, volume and tone controls where necessary, all to no avail. I have tried these programs on other BBC model Bs and they load perfectly. – L.J. Beacher, Horsham.

SOLVED

At one time Acorn produced a serial ULA which was more fussy than the original one. As a result some software protection achieved the ultimate in protection of not even allowing it to be loaded in.

A dealer should be able to fix another ULA, or the software house give you a version that works with your machine.

EXTRA STAR COMMANDS

*MULTI	Initialises Multi-Basic. This will increase PAGE by &300 bytes. For example, with a DFS fitted PAGE is moved from &1900 to &1C00.
*EVENTSOFF	Disables multi-tasking.
*EVENTSON	Re-enables multi-tasking.

From Page 56

control cards which are fitted with both BBC Basic and Multi-Basic. This makes it possible to solve interfacing problems on the BBC Micro before transferring programs to the control cards.

There is a good clear manual considering that the ideas will be new to many, with numerous example programs and a section with do's, don'ts and avoids.

Scientific and industrial uses will be the biggest group to benefit from the extra facilities, but anyone who hooks even the simplest piece of hardware to the BBC Micro should take a look at this excellent piece of firmware.

EXTRA COMMANDS ADDED TO BASIC

Command	*Purpose*
CONFIGURE	To write a bit pattern to a VIA register.
DECLD	To test whether a task is currently declared.
DISABLE	Removes a task from the current task list.
ENABLE	Enables a task.
ENABD	Tests whether a task is currently enabled.
EVERY	Together with ENABLE, defines the time interval between successively calling a task.
EXIT	Marks the end of a task definition.
FETCH	Reads a given VIA register into a memory location.
OMIT	Disable and then delete a task from the current list.
RD_TIMER	Read a selected system timer.
SETBITS	Set a bit or bits in a VIA register.
SET_TIMER	Writes a new four byte value to a system timer.
SHIFTL	Shift left the contents of a VIA register.
SHIFTR	Shift right the contents of a VIA register.
TGGLE	Perform an Exclusive OR on a VIA register.
UNSET	Clear a bit or bits in a VIA register.
WAIT	Suspend all program activity for a specified period.
WHENEVER	Used together with ENABLE to run a task whenever a given condition is true.

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BROTHER HR15
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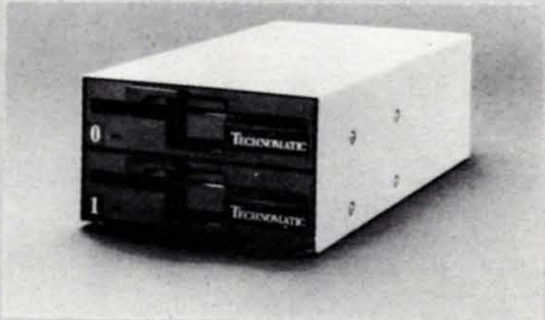
The mechanisms are set inside a sturdy monitor stand painted in 'BBC-matching' beige. Its 'looks' are enhanced by its black front panel, with attractive enamel-white markings.

These disc drives with a built-in monitor plinth provide a compact installation and give a professional look to the system.

As with all standard TECHNOMATIC drives it comes complete with a data cable, and a mains lead with a suitably fused 13A moulded plug.

PD800P 2×400K/2×640K 40/80T DS **£279 (a)**

PD800



TECHNOMATIC's stacked drives are housed in smart metal casings painted in BBC beige colour and are built to the same exacting standards as PD800P drives. The drives are fitted with integral switch mode power supply and supplied with a mains lead with a suitably fused 13A moulded plug and a data lead.

These drives are fitted with the new model MITSUBISHI mechanisms, which have been specially adapted for us to fit the 40/80 track switches on the front panel of the mechanisms. This would mean that the user no longer needs to grope at the rear of the drive to set the correct track setting.

PD800 (2 × 400K/2 × 640K 40/80T DS) **£249 (a)**

TECHNOMATIC's single drives are also housed in metal casings painted in BBC beige colour and are offered with or without power supply. All drives are supplied with data cables and suitable power leads. Mains powered drives have a lead suitably fused with a 13A moulded plug.

1 × 400K/1 × 640K 40/80T DS

TS400 **£109 (b)** **PS400** with psu **£129 (b)**

SPECIAL OFFER

ACORN's Single Drive 1 × 100K/1 × 160K 40T SS £49 (b)

TS35

3.5" DRIVES

These compact drives, used with most of the new 16 bit micros offer fast access times and high performance with minimum of power consumption. The mechanisms are 80 track double sided and are capable of both single and double density operation. The single drive is offered in a dual case with a blanking plate for future upgrading. The drives are offered with or without integral mains power supply and they are supplied with all the necessary cables to make them ready for connection to a computer. Mains powered drives are supplied with a lead with suitably fused 13A moulded plug.

1 × 400K/1 × 640K 80T DS	**TS35 1** £109 (b);	**PS35 1** with psu	£129 (b)
2 × 400K/1 × 640K 80T DS	**TD35 2** £199 (b);	**PD35 2** with psu	£209 (b)

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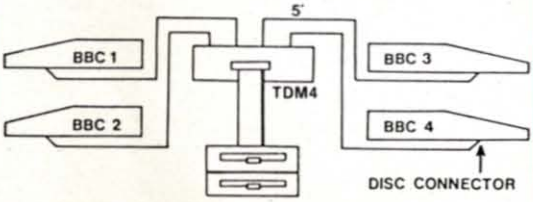
DISC DRIVE MULTIPLEXER

The cost-effective alternative to networking! A self-contained unit that enables up to four computers to be connected to one single or dual disc drive. No hardware modifications — simply plugs into the computers disc interface connectors. No ROMs or other software needed. All DFS commands work as normal. The switching of drives between computers is totally automatic and completely invisible to the user. This unit is ideal for installing in classrooms and other situations, where networking is not planned or necessary, or where costs must be kept low. In many cases software needs to be shared, although full networking complexity and cost is not needed. Several of these units can be connected in series to allow more computers to access the same discs, i.e. two quads connected together will allow 7 computers to share 1 drive. Units are supplied with 5' of cable per outlet as standard. Mains powered.



TDM4 Quad Unit (up to 4 computers)	£135 (a)
TDM2 Dual Unit (2 computers)	£75 (b)

DISC STORAGE BOXES

10 5¼" Disc Library Case £1.80 (d)
30 5¼" Disc Lockable Box £15 (c)
40 5¼" Lockable Box £9.50 (c)
100 5¼" Disc Locable Box £15 (c)
10 3½" Disc Case £3 (d)

3M 5¼" FLOPPY DISCS

40 T SS DD £12 (d)	40 T DS DD £16 (d)
80 T SS DD £21 (d)	80 T DS DD £22 (d)

£1 extra pack for library case packing

3M 3½" FLOPPY DISCS

80 T SS DD £30 (d)	80 T DS DD £38 (d)

Discs in packs of ten

DRIVEHEAD CLEANING KIT

The **FLOPPICLENE** drive head cleaning kit is an ideal way to ensure the optimum performance of your drives. The use of disposable cleaning discs eliminates the risk of contamination and abrasion of sensitive driveheads. These risks are normally inherent in the reusable drivehead cleaning kits.

Floppiclene with 20 disposable cleaning kits.

5¼" £14.50 (d)
3½" £16.00 (d)

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(a) £8 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00.

COLOUR MONITORS

RGB MONITORS *(all monitors supplied with a BBC lead)*

1431 14″ RGB Std Res	452 × 585 pixels	£179 (a)
1451 14″ RGB Med Res	653 × 585 pixels	£235 (a)
1441 14″ RGB Hi Res	895 × 585 pixels	£375 (a)

MICROVITEC 14″ RGB/PAL/Audio

1431AP 14″ Std Res	452 × 585 pixels	£205 (a)
1451AP 14″ Std Res	653 × 585 pixels	£275 (a)

The above monitors are available in plastic or metal case.

MICROVITEC 20″ RGB/PAL/Audio

2030CS 20″ Std Res £380 (a) **2040CS** 20″ Hi Res £685 (a)

TAXAN KAGA 12″ RGB:

Super Vision III + with amber/green option £345 (a)

MITSUBISHI XC1404 14″ Med Res RGB:
BBC/IBM Compatible. A new monitor with etched dark screen with both brilliance and contrast controls giving sharp graphics and text display. £249 (a)

TOUCHTEC-501

Designed for use with Microvitec metal cased monitors, and using the RS-423 socket, this unit brings genuine touch-screen operation to your BBC. Ideal for the educational market. Supplied with a users handbook and utilities disc containing starter programs and development software.

Touchtec 501 £260 (b)

EPROMER II

EPROMER II
TECHNOMATIC LTD.

A sophisticated eprom programmer that handles the full range of popular single rail eproms (incl 27256) and allows the user full control of the programming process.
Its powerful menu driven software makes the programming of eproms simple, efficient and eliminates the need to have fiddly switches for selecting eprom types, programming voltage or method. The features include:

- Integral power supply ensures no power drain from the computer.
- Interfaces through 1 MHz bus, fully buffered.
- Clear and simple instructions displayed on the screen make the programming easy for both the first time user and the advanced user.
- Eproms upto 16K (27128) programmed in single pass (27256 in two passes).
- Selectable programming voltage 25/21/12.5V
- Selectable programming method — normal or high speed algorithmic. High speed programming enables 27128 to be programmed in just over 2 mins. Normal programming skips addresses with FF data to increase programming speed. Automatic verification on completion of programming.
- User can select any section of the eprom from a single byte to its full address range to Blank Check/Read/Program/Verify enabling program development/changes very simple.
- Full screen editor with HEX/ASCII input.
- Data input from keyboard/Tape/Disc/Eprom.
- Software interface for integration of user's special requirements.
- Constant display of all options selected.
- Several BBC BASIC programs can be entered on a single eprom.
- Checksum facility allows for easy identification of programmed roms.
- Enter OS Commands from within the epromer program.

EPROMER II with Manual & Software on disc £99 (b)
ROM based software £10

UV ERASERS

UV1T Eraser with built-in timer and mains indicator. Built-in safety interlock to avoid accidental exposure to the harmful UV rays. It can handle up to 5 eproms at a time with an average erasing time of about 20 mins. £59 (b)

UV1B as above but without the timer. £47 (b)

MONOCHROME MONITORS

KAGA

KX1201G 12″ HI-RES green etched screen	£99 (a)
KX1203A 12″ HI-RES amber etched screen	£105 (a)

SANYO

DM8112CX 12″ HI-RES green screen	£95 (a)

PHILIPS

BM7502 12″ HI-RES green screen	£75 (a)
BM7522 12″ HI-RES amber screen	£79 (a)

MONITOR ACCESSORIES

Microvitec Swivel Base (14″ plastic monitors)	£20 (c)
Kaga Swivel Base for mono monitors with integral clock	£22 (c)
Philips Swivel Base	£14 (c)
Monitor Plinth	£13.50 (c)
Double Tier Plinth for flat drive, computer and monitor	£19.50 (c)
Kaga RGB Cable	£5 (d)
Microvitec RGB Cable	£3.50 (d)
Monochrome BNC/PHONO Cable	£3.50 (d)

REAL-TIME CLOCK CALENDER

time-warp
real-time clock

A low cost unit, allowing the facilities of units costing far more. Built to professional standards, it opens up the total spectrum of Real-Time applications. Possibilities include desk diary/planner, calender, continuous display of on-screen time and date information, automatic document dating, precise timing and control in scientific applications — its uses are endless. Simply plugs into the user port — battery backup is supplied as standard. A full manual as well as extensive software including a simple demonstration diary/planner application program on disc. £29 (c)

ROM/RAM EXPANSION SYSTEMS

ARIES B-32 BOARD: Features 32K of RAM and a 16K ROM socket. RAM can be configured as 20K or 16K as shadow RAM and 12K or 16K or 32K sideways RAM. New commands include comprehensive sideways ROM/RAM management system, simplified direct access to screen RAM and the ability to move/swap the contents of any area of memory. ROM/RAM management system allows RAM allocation, list ROMs, load sideways RAM, disable ROMs, and extend any buffer including printer buffer.

AIRES B32 RAM BOARD	£79 (d)
ARIES B12 ROM BOARD	£40 (d)
ARIES B12C Adaptor Board for B12	£7.50 (d)

ATPL SIDEWISE ROM EXPANSION BOARD A well constructed expansion board, simple to instal and requires no soldering. All buses are buffered. It allows full sideways rom expansion to 16 ROMs. One socket has been split into two 8K sockets to allow the use of 8K CMOS RAM. Battery backup option allows data retention in the RAM when the computer is switched off. Several link selectable options including write protect for the RAM. ATPL Board £37 (Battery Backup Kit £18 (d).

ATPL Board for BBC PLUS 10 × 16K ROMs	£29 (d)
COMPUTER VILLAGE CV-16 Rom Board	£38 (d)

RAMROM-15 The advanced sideways ROM/RAM expansion system. This is an external unit, using high quality construction, attractively packaged in a BBC coloured metal case, allowing easy access to all the sockets. No soldering is required. Allows 11/12 additional sideways ROMs to be fitted with an option of up to 16K sideways RAM. All commonly available RAM can be used i.e. 4801/6116/6264 or xx128. Battery back-up fitted as standard. For development work and further expansion, most of the 6502 processor signals are available. Supplied with utility disc and full instruction manual. £79 (b)

(Above boards are for use with standard BBC computer and not compatible with B plus unless specifically mentioned)

MULTIFORM Z80

The MULTIFORM Z80 2nd Processor for the BBC Micro — opens the horizons of CP/M software to the BBC micro user

- Will enable running of almost any CP/M applications software
- Will enable transfer of data between different disc formats
- Emulates the two terminals most frequently used by CP/M software

MULTIFORM Z80 interfaces directly to a normal BBC micro requiring no hardware changes. It is supplied with OS/M operating system in rom which can run all software that obeys CP/M 2.2 constraints and its configuration is not hardware specific.

MULTIFORM Z80 is truly flexible and can be used with any BBC micro drive system, single or dual drive, 40 or 80 track format and single or double sided. Unlike other currently available Z80 processors for the BBC micro, there are absolutely no restrictions on the type of drive that can be used with the MULTIFORM Z80.

MULTIFORM Z80 plugs into the 1MHz bus connector of the BBC micro. It is mains powered and does not put any extra load on the BBC's psu. The data cable can be several feet in length, allowing convenient siting of the MULTIFORM Z80, unlike present second processors, which have 8" cables.

The formats supplied include: Acorn Z80, RML 380Z and 480Z, Torch (read only), Osborne, Televideo ... we also offer to configure other formats at an extra charge."

Rom based OS/M operating system is fully compatible with Acorn's single and double density disc interfaces. Installing the OS in rom allows more space on discs for programs and data and response to system commands is very fast. (Note: Single density DFS will only read/write to single density CP/M formats).

MULTIFORM Z80 can format, read or write from a very wide range of CP/M disc formats. On a dual drive system, the drives can be set up independently to run two different formats at the same time. This will enable:

- The user to buy software from a very wide range of suppliers without having to worry about the type of format supplied.
- Interchange of valuable data and files among users of various CP/M computers.
- Using a system at home for preparing data required in the office.
- Software writers/developers to write software in any one format and transfer it to any other format without having to pay for expensive porting charges.

MULTIFORM Z80 is supplied with a library of a number of popular CP/M formats and a utility disc containing a program for creating files for the additional formats. Each library can load 32 formats and there are no restrictions on the number of librarires that can be created.

The utility disc also contains a program to interconvert ASCII texts wordprocessed on a normal BBC and under OS/M or CP/M.

MULTIFORM Z80's terminal emulation includes the ADM-3A, the HAZELTINE 1500 and the BBC VDU making the installation of most of the well known CP/M software easy.

MULTIFORM Z80 converts your BBC computer into an almost universal CP/M machine and adds the power of being able to run two different formats simultaneously, which currently is possile on only the very sophisticated specialist machines.

For any one working or intending to work in a CP/M environment, MULTIFORM Z80 is an indispensable tool.

In offices where there are a multitude of CP/M machines and a few BBCs, MULTIFORM Z80 will prove to be invaluable for transferring data between the various CP/M machines.

MULTIFORM Z80 (including utility disc, library disc and manual) **£299 + £4 p&p**

(When ordering please specify the type of DFS, MULTIFORM Z80 will be used with)

CP/M SOFTWARE FOR TORCH & ACORN Z80 PROCESSORS

We can now supply almost any CP/M based software package in a format suitable for the Torch Z80 and Acorn Z80 second processors. Phone for details on prices for popular packages for IBM

Please phone for our new professional software catalogue

WORDSTAR PROFESSIONAL The advanced word processing package comprising of WordStar, MailMerge, StarIndex and SpellStar, a total combination offering substantial savings on individual prices. WordStar is the best selling word processing program on the market. Extensive operator aids include a comprehensive friendly manual, step-by-step training guide, command cards, on-screen menus. Spellstar checks text files against its 20,000 word-plus dictionary. You can both add to the dictionary and create specific supplementary ones. Mailmerge is ideal for mailing applications. It enables the fast production of personalised form letters, mailing labels, invoices, etc. StarIndex creates alphabetical indexes, tables of contents, paragraph numbering etc.

WORDSTAR PROFESSIONAL £310 (a)
WORDSTAR £275 (a) **WORDSTAR Upgrade to W/S Prof** £195 (a)

DBASE-II Undoubtedly 'The Database', can be used for an almost limitless number of business applications, ranging from mailing list preparation through to running accounting ledgers and payrolls. An on-disc tutorial takes you from setting up a simple file all the way through to setting up custom screens and reports. Automatic calculations may be performed on data. Fields or entire databases may be modified or replaced with single, English-like basic commands; Dbase-II can therefore be used by general personnel having no programming knowledge. It can be tailored to suit a variety of professions and individual needs, with files such as accounting, payroll, time billing, job costing, scheduling and mailing lists. It can access several files at a time. It is fast, flexible and powerful.

SAGE ACCOUNTS: This package has been designed for the smaller business, for the user who is unfamiliar with computers but wanting or needing to computerise the bookkeeping and accounting functions. Sage is easy-to-learn and easy-to-use and is complete with a full tutorial booklet and a free manufacturers 90-day 'Hot-Line' support. It is a truly integrated package (all on one disc!) and covers Sales, Purchase & Nominal Ledgers, with a capability of handling up to 9999 accounts per ledger. It will handle all your Sales and Purchase invoices and can easily generate account & management reports. £375 **Sage plus** (£695) for the larger business, and **Sage Payroll** (£195)

Other packages available include PRO-PASCAL, CIS-COBOL, Supercalc II, MACRO-80 etc. Please telephone with your requirements.

A.T.I. Trainers — these superb interactive training discs simulate the package being studied. A unique screen technique provides a friendly interaction — in the upper area, a faithful reproduction of the screen is displayed, while at the bottom, a series of prompts and explanations lead the student through the exercise. ATI trainers available include Wordstar, dBase-II, dBase-III, Multimate, Multiplan, Word at £75 (b). Please phone for other trainers.

TORCH GRADUATE IBM SOFTWARE: We are able to supply most popular software packages including: WORDSTAR, WORD, EASY-WRITER, DBase-II & III, LOTUS-123, VISICALC, SAGE etc. Please telephone with your requirements.

PROFESSIONAL SOFTWARE PUBLICATIONS

Wordstar made easy	£16.95 (c)	Multimate Complete Guide	£15.95 (c)
Introduction to Wordstar	£14.95 (c)	ABC of LOTUS 123	£13.95 (c)
Wordstar Handbook	£11.95 (c)	The RS232 Solution	£15.95 (c)
dBase-II for the first time user	£18.95 (c)	CP/M Bible	£15.95 (c)
Understanding dBase-II	£17.95 (c)	Soul of CP/M	£14.95 (c)
Understanding dBase-III	£20.95 (c)	CP/M Handbook	£13.95 (c)
Multiplan Made Easy	£18.95 (c)	Mastering the CP/M	£16.95 (c)

(no VAT on books)

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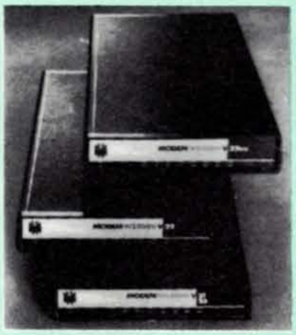
(c) £1.50
(d) £1.00.

COMMUNICATIONS

MIRACLE WS3000 Range: * A new, professional series of intelligent modems with full auto dial and auto answer facilities as standard. * HAYES protocols are implemented allowing the use of a wide range of well proven communications software. 'Plain English' command structure simplifies the use of the modem even for the first time user. * All models feature a centronics compatible printer port allowing direct output to a printer. * A line sharing facility that allows WS3000 to differentiate between calls intended for data, and those for speech. * An intelligent speed buffered RS232 port and a wide range of available data rates makes this one of the most powerful multi speed range of modems available. * Line noise filtering ensures error free transmission and reception of data on long or noisy lines. * Internal battery backup allows storage of 63 names and telephone nos. * This range of modems can be factory fitted with high security data access protection system. * Models V2123 and V22 can be factory upgraded to V22bis standard giving a single compact modem capable of data rates from 75bps to 2400bps.

APPROVED for connection to telecommunication systems specified in the instructions for use subject to the conditions set out in them.



WS3000 V21/23: This modem complies with the CCITT V21, V23 and Bell 103 standards and operates at CCITT standards for 300bps, 75/1200bps, 1200/75bps full duplex, 600bps and 1200bps half duplex, and the Bell standard for 300bps full duplex. **£295 (b)**

WS3000 V22: This modem operates on all V2123 standards plus V22 standard for 1200bps full duplex V22bis standard. **£495 (b)**

WS3000 V22bis: This modem operates on all V21/23 and V22 standards plus 2400bps full duplex. **£650 (b)**

BBC Data Cable for WS3000 **£6 (d)** Data cables for other micros available.

MINOR MIRACLES WS2000 This highly successful world standard modem, having BT approval, covering V21, V23, (BELL 103/113/108 outside the UK) and including 75,300,600, 1200 Baud ratings. What possibly gives this modem its biggest advantage is its option of computer control. A 25Way RS232 input as well as possible computer controlled auto/dial/auto-answer makes this modem unique. **WS2000£125 (c)** Data Cable **£7.**

WS2000 Auto-Dial card: includes an integral loudspeaker for monitoring of the phone line**£30 (d).**
BBC User Port cable (for modem control)**£4 (d)**

WS2000 Auto-Answer Card£30(d).
(Please note that the A/D & A/A Cards are still awaiting BABT Approval.)

SKI KIT (Allowing total control of the modem by your computer) **£10 (d)**

DS1 Disc (for Commstar): When used with the Auto-dial card, SK1 Kit, and a user port cable, this software will dial out to Prestel, enter your password etc. and leave you in Commstar. Will also store many bulletin board telephone numbers and protocols for autodialling **£10 (d)**

GEC DATACHAT 1223 Modem: An economically priced BABT approved modem complying with CCITT V23 standard capable of operating at 1200/75bps and 75/1200bps and 1200/1200bps pseudo full duplex. It is line powered does not require external power source. It is supplied with software suitable for connecting to PRESTEL, Micronet 800, Telecom Gold and a host of bulletin boards. **£86 (b)**

DATA-BEEB An advanced communication ROM from Miracle Technology. Its many features include both Viewdata (Prestel) and Terminal modes, Auto-Answer and Auto-dial for fully expanded WS 2000's etc. Macro facilities allow flexible use of its many facilities e.g. automatic dialling, log-on, going to a specific page, printing it, and going off-line, all in one operation. **£24 (d)**

COMMUNICATIONS SOFTWARE

CONNECT-3000 AN ESSENTIAL UTILITY FOR THE WS3000 OWNER — a dedicated control package specially written to optimise the potential of the WS3000 series of modems. It provides a friendly menu-driven 'front-end', for the superb but rather complex multitude of facilities of the 3000 — no need to remember register nos. or complex command codings etc. It provides easy control for Prestel, Terminal, Auto-Answer/Dial use, while a unique 'default' facility provides automatic, pre-defined screen presentation. Works in conjunction with ALL communication software, including Commstar, Data-Beeb, Termulator, Termi, Communicator etc.
40/80 Disc **£16.50 (d)**

TERMULATOR An advanced terminal emulator on a 16K Rom. Emulations include VT52/100, Tektronix 4010 etc. Allows a BBC to be used as a terminal for almost any mainframe computer or computer network. **£25 (d)**

COMMUNICATOR This is a full 80 col VT100 terminal emulation program on 16K eprom. It is a more advanced program than TERMI and features easy to follow screen menus. The rate at which data is sent or received is easily set up with rates up to 19200 Baud with 80 column text. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Communicator is not suitable for PRESTEL). **£49 (d)**

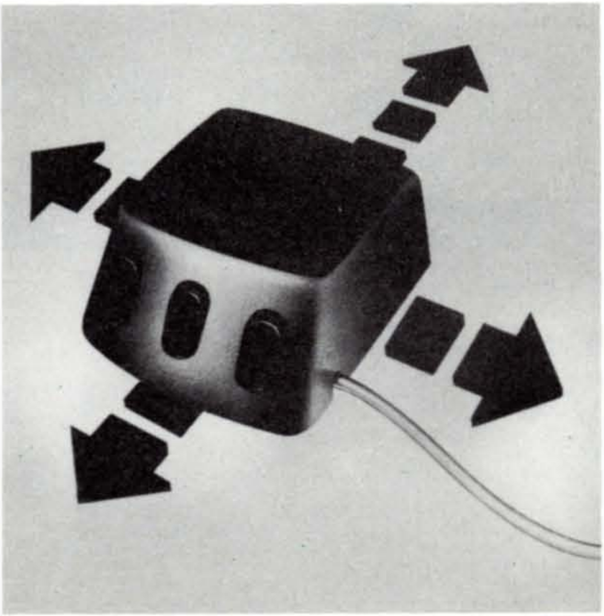
RS232 Solution (Book) **£15.95 (c)**

COMMSTAR An ideal communications rom for both Prestel and bulletin boards. Facilities include Xmodem, clock etc. **£28 (d)**

RS232 SolutionBook **£15.95 (c)**

AMX MOUSE with SUPERART

The mouse will now be available with enhanced software, the 'SUPER ART' which is compatible with 6502 2nd processor, the ARIES RAM board, BBC+ shadow mode, tape and ACORN DFS and ADFS. Allows full use of colour in mode 1. Disc users can create colour pictures in A4 size with dot resolution by scrolling the screen window. Other facilities include, colour pattern editing, use of icons, additional text styles, superb zoom in colour.
There is a variety of optional software to make the mouse one of the most versatile peripherals that can be added to the BBC micro.



AMX Mouse with Super Art **£67 (d)**

AMX Super Art Package on its own **£43 (d)**

AMX PAGEMAKER provides a high resolution A4 Typesetting and Artwork system. **£47 (d)**

AMX 3D ZICON will let you transform three dimensional vector data and translate them into 3D on screen graphics. **£21 (d)**

AMX DATABASE is a new filing system with 1000 records per file and unlimited number of fields per record. **£21 (d)**

RB2 TRACKER BALL

A precision built tracker ball. Software allows RB2 to function instead of cursor keys, for word processing, CAD/CAM etc. Software includes a graphics/CAD package.

RB-21 (with 'icon artmaster'). **£59 (c)**

FIRMWARE AND SOFTWARE

DATABASE MANAGEMENT SYSTEMS

VIEWSTORE An exciting, powerful database with many features: Display can be 'spreadsheet' or 'card-layout' type. Powerful selection and sorting utilities. Any screen mode can be used. Data can be sent to View and ViewSheet. Maximum file size 4096MByte! Maximum record size 60K. **£44 (d)**

STARdataBASE A fast machine code, true random access database program in a 16K Eprom. Up to 4096 records in a file, up to 69 fields in a record. The record layout is totally user defined. Entirely menu driven — thus very user friendly. Extremely fast searches are possible using the Keysearch facility. Mailmerging from View and Wordwise, and address labelling. **£59 (d)**

MASTERFILE II The new version of the popular general purpose file management system allowing large amounts of information to be stored and processed. It allows up to 17 fields per record, and the only limitation as to the number of records is the capacity of the disc. This latest version features many new facilities including use with WORDWISE/VIEW **£17.00 (d)** Disc (80 or 40T).

GEMINI'S DATAGEM **£59 (c)**

WORD-PROCESSORS

VIEW Acorn's version V2.1 word processor rom. **£44 (c)**

VIEW VERSION V3.0 Also compatible with BBC + Complete with Printer Driver Generator. **£69 (c)**

HI VIEW Disc based version of VIEW word processor for use with the 6502 2nd processor. Allows 47K of user memory. **£36 (c)**

VIEW INDEX Disc based program to create an index from VIEW text files. Ideal for anyone concerned with writing extensive reports or books. **£10 (d)**

VIEW PRINTER DRIVER GENERATOR: This driver generator will enable you to produce a driver to suit your printer and also let you view the text as it will appear on the paper including condensed, italics, sub and super script modes. **£10 (d)**

VIEWSPELL: A rom based spelling checking utility with a dictionary of 70,000 words on disc. Additional/specialised dictionaries can be created. Facility to search the dictionary for words beginning with or ending with certain characters. **£52 (d)**

WORDWISE **£28 (d)**

WORDWISE PLUS The new advanced Wordwise on a 16K eprom, for the more specialised users who require added features and flexibility. Four new programs are also supplied allowing mail-merging, index generating, two-column text printout and continuous processing. **£47 (d)**

WORDEASE A rom based utility for the Wordwise plus. **£24.50 (d)**

SPELLCHECK III A 16K rom based program for View and Wordwise plus. Contains 2000 words on the rom and 6000 (expandable to 17000) on disc. **£31 (d)**

SPREADSHEETS

VIEWSHEET Acorn's spreadsheet provides 255 columns and 255 rows and will operate in any mode. Windows can be created which can then be rearranged to provide any print format required. Function keys provide for easy entry of commands. Printer control codes can be used using the printer driver. Fully compatible with VIEW and the 6502 2nd Processor. **£44 (d)**

VIEWPLOT: A disc based Linear graph/barchart/piechart plotting program. **£25 (d)**

INTERSHEET The new spreadsheet from Computer Concepts. Many advanced facilities including 105 character display, several spreadsheets may be used at once, may be used with View & Wordwise etc. etc. **£49 (c)**

INTERCHART Graphics Package for the Intersheet. **£49 (d)**

ULTRACALC **£49 (d)** **QUICKCALC** **£14.50 (d)**

LANGUAGES

META-ASSEMBLER: Both an editor and Macro-Assembler. Meta can assemble most 65xx, 68xx, 6804, 6805/6305, 6809, 8048, 8080/8085, Z80, 1802 and more. (Free updates due very soon — 68000 series, 8088/8086, Z8000 etc.) Many advanced features including Macros, conditional assembly, Global/selective search etc. Includes 16K Eprom, disc, function key card, and comprehensive manual. Please phone for comprehensive leaflet. **Meta-Assembler £126 (c)**

ACORN P-SYSTEM A portable operating system supplied complete with USCD PASCAL and FORTRAN 77. **£259 (b)**

6502 DEVELOPMENT PACKAGE A Macro-Assembler with utilities for use with the 6502 2nd Processor. Enables the serious programmer to develop large programs in assembly language. **£39 (d)**

ACORN MICRO-PROLOG: The logic programming language seen as the language for programming in the future and used extensively in the artificial intelligence field. A simple 'front end' is supplied to make syntax more user friendly for new users. 16K Rom, manual and extension modules. **£62 (c)**

ISO-PASCAL Acorn's full implementation of International Standard Pascal on two 16K ROMs. Disc Version for use on 6502 2nd Processor also supplied. Comprehensive manual. **£48 (a)**

ISO PASCAL Stand ALONE GENERATOR: Utility to convert programs produced using ISO PASCAL for stand alone applications. **£28 (d)**

ACORN LOGO A full implementation of the Logo language from Acornsoft. Supplied as two ROMs with a tutorial course and technical manual. **£49 (b)**

LOGOTRON logo **£56 (c)**

BCPL A full implementation of the BCPL compiler language consisting of the language of ROM, disc containing the BCPL compiler, a screen editor, a 6502 assembler, other utilities and programming aids and examples of BCPL code and a 450 page manual. **£46 (b)**

BCPL CALCULATIONS PACKAGE Supplied on disc, it supports floating point, fixed point and fast integer calculations. It includes the BCPL calcultion files, example files and a comprehensive user guide. **£17.30 (d)**

BCPL STAND ALONE GENERATOR **£39 (d)**

Acorn LISP Rom, Acorn FORTH Rom, Acorn COMAL, (each) £39 (d)

MICROTEXT A frame based authoring system from National Physical Laboratory for interactive computer tutoring. Disc based. **£49 (c)**

G:FORTH An advanced implementation of FORTH which follows the 79-Standard specification on a 16K ROM and has a full double number extension set. **£39 (d)**

OXFORD PASCAL A fast, compact P-Code compiler, that fully utilises BBC Graphics and sound, contains a powerful editor, and produces 'standalone' software. (Specify 40/80T) **£35 (c)**

UTILITIES

ACCELERATOR	£49 (d)
ACORN BASIC EDITOR	£24 (d)
BROM	£28 (d)
SLEUTH	£24 (d)
TOOLKIT plus	£31 (d)
EXMON-II	£22 (d)
HELP II	£27 (d)
DISC DOCTOR	£26 (d)
DISCMASTER	£18 (d)
ACORN GRAPHICS ROM GXR	£23 (d) **(specify BBC B or BBC B PLUS)**
COMPUTER CONCEPTS GRAPHICS ROM	£22 (d)
PRINTMASTER	£26 (d)

DUMPMASTER II 16K rom with dump routines and a variety of features for about 40 different printers. **£26 (d)**

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When ordering software on disc please specify track format (40/80)

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Acorn ISO Pascal Ref Manual	£12.50
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BBC User Guide Acorn	£15.00
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BBC Micro Sideways Roms B. Smith	£ 9.95
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View 3.0 User Guide	£12.50
Viewstore	£12.50
Viewsheet	£12.50
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BBC Micro Disc Companion	£ 7.95
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Disc Programming Techniques	£ 7.95
Disc Systems	£ 6.95

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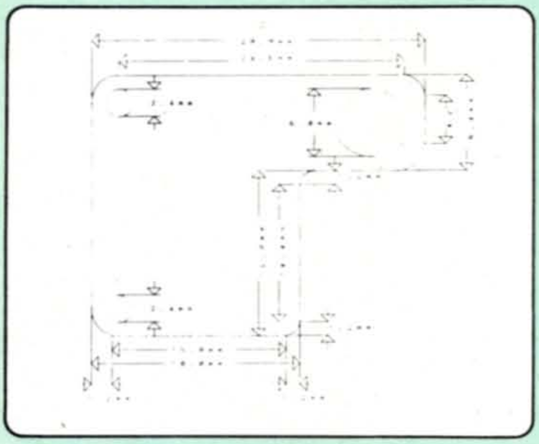
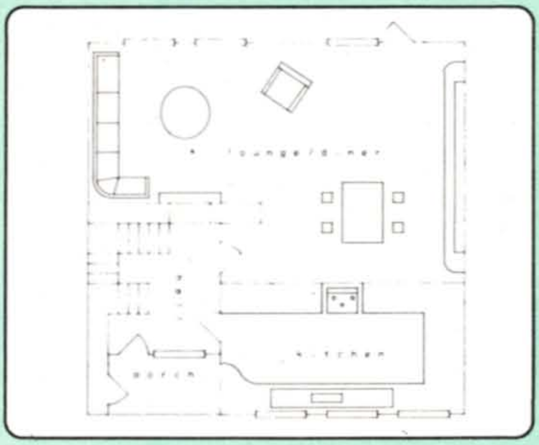
NOVACAD

Computer Aided Draughting for the BBC Micro





A sophisticated CAD package with unique facilities which until were confined to custom built CAD packages.

Whether you want to draw a complex electronic circuit diagram or plan your new kitchen or simply draw a cube NOVACAD will help you do it better and more easily.

All you need is a BBC micro model B fitted with Acorn DFs and a single disc drive. If you have a 6502 2nd processor and a dual disc drive then NOVACAD's capabilities are further enhanced.

- Very user friendly with all commands and controls from the keyboard. Special windowing techniques make available to the user almost one million dots allowing a lot more detail to be put on the drawing than one would normally expect the BBC to be capable of. The drawing can be 4 windows across and 5 up.
- Libraries of user defined ICONS such as electronic symbols can be created easily and edited even in the middle of drawing another diagram. ICON size is not limited to a number of pixels. An ICON can contain up to 500 lines, so complete drawings or sections of large drawings can be saved as ICONS for use with other drawings.
- ICONS can be called by name from a library into any part of the diagram and can be moved, enlarged, reduced, rotated in 90° steps and have mirror images made before being finally positioned.
- Shapes can be copied on the screen as many times as required.
- The zoom facility allows the user to magnify any section of a drawing by up to 20 times to make it easier to insert details.
- Horizontal and vertical displacements can be measured in any user defined scale.
- Any two colour can be used in mode 4.
- Up to '8 levels' can be used to produce multi layer drawings, and then user can decide which levels are to be displayed. This can be particularly used in pcb drawings, architectural drawings with details of the services behind the walls displayed only when required and many other such applications.
- Text can be added at any position vertically or horizontally.
- Use of 2nd processor will allow use of any 4 colours, higher pixel density drawings and considerably faster operation. (NOVACAD without the 2nd processor is faster than any other CAD package we have seen for the BBC).
- Powerful delete facilities allow deletion of single lines or whole sections with minimum of key presses.
- Printer dump for Epson compatible printers incorporated in the software which allows a full or a sectional screen dump.
- An optional plotter utility contains a plotter configuration program allowing the user to configure a program for his plotter. Pre-configured programs are included for a number of popular plotters.

NOVACAD will prove to be an invaluable teaching aid in technical schools and colleges and for anyone involved in draughting it will be an ideal labour saving tool.

NOVACAD package with 16K ROM, Utility disc and a comprehensive manual £79 (c).

Novacad compatible with Tracker Ball/AMX Mouse £99 (c)

Stand Alone Mouse for use with NOVACAD £34 (d)

Upgrading of existing ROMs and DISCS £20 (d).

Plotter Utility Program £28.50 (d)

BBC COMPUTER SPARE PARTS (Carriage code (d)

Complete Keyboard	£52	6502A 2MHz CPU	£6.50	UPD7002	£5.00	74LS163	'£0.75
Power Supply Unit	£52	65CO2 CMOS CPU	£12.00	DS3691	£3.50	74LS244	£0.80
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Serial ULA	£14.00	SAA5050-Teletext	£9.00	74LS10	£0.24	8271	POA
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Canon PW1080A (nlq)	233.91	269.00
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Juki 5510 Multicolour upgrade	97.20	111.78
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Philips TV/Monitor	208.65	239.95
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SX400S 80 track double side (400K) 40/80	86.91	99.95
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NOTE – All 80 track drives have a 40/80 switch!

Challenger 256k (upgradeable to 512K RAM) with 80 track double sided drive and disc interface	182.56	209.95
Challenger 256K to 512K Upgrade	31.26	35.95

DRIVES FOR THE AMSTRAD

DD-1 Drive + Interface	138.22	158.95
FD-1 (No Interface)	86.04	98.95

MICROVITEC RGB MONITORS (BBC)

1431 (472 x 585 dots)	182.57	209.95
1431 APMS4 (with audio & PAL)	199.96	229.95
1451 (653 x 582 dots)	234.74	269.95
1451 APMS4	299.09	343.95

Dept. MU486, 46 Middle Street,
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Wordwise	(Word-processor)	31.26	35.95
Wordwise Plus	(Word-processor)	40.65	46.75
View 2.1	(Word-processor)	41.26	47.45
View III	(Word Processor)	61.00	70.15
Ultracalc II	(Spreadsheet)	57.35	65.95
Printmaster	(Printer graphics)	23.91	27.50
Graphics ROM	(Computer Concepts extensions to Basic)	23.91	27.50
Help	(on Basic keywords etc)	23.44	26.95
Sleuth	(Basic debugging tool)	26.48	30.45
Communicator	RS432 & terminal)	48.17	55.39
Disc Doctor	(Disc utility)	23.91	27.50
Replica 2	(Backup tape to disk utility)	10.43	12.00
Betabase	(Database Disk)	20.00	23.00

COMPUTERS

BBC B+ 64K	382.67	439.95
BBC B+ 128K	417.35	479.95
Master 128	426.04	489.95

AMSTRAD COMPUTERS

PCW8256	391.26	449.95
CPC 6128 (Green)	252.13	289.95
CPC 6128 (Colour)	339.09	389.95

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DFS 2.0 BBC Disc Interface	60.82	69.95
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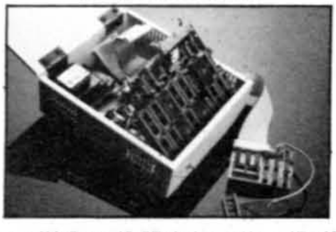


A very powerful system which allows total flexibility for the user with a capability of 24 ROM sockets plus 64K of sideways RAM (not supplied) built in a sturdy metal case with hinged lid for easy access, and sprayed BBC oatmeal colour. Much thought has gone into the design of this unit to incorporate as many features as possible.

SOME ADVANTAGES

- Allows up to 24 ROMS plus 64K of RAM or various combinations for the customers requirements.
- Easy to install. No soldering. Takes no more than 15 mins.
- Own power supply. No over-heating.
- Write protect switch fitted for RAM.
- No access into BBC required after initial installation.
- Does not physically interfere with other internal expansion add-ons.
- Computer will still function with external unit unplugged (using ROM resident in BBC).
- Accessible for installing or removing ROMS.

NEW FEATURES

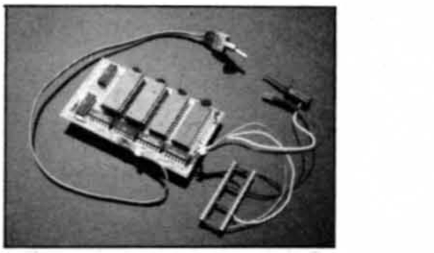
- **Battery backup facility.**
- **32K of RAM on each card.**
- **Read protect link.**

THE UNIT

The case comes complete with an in-built power supply and one board capable of offering 12 extra sockets plus the four in the BBC. 32K of sideways RAM can be fitted to this board losing only 2 ROM sockets. A second board identical to the first can be fitted at a later date, giving a total capability of 28 sockets for ROM/RAM. Write protect toggle switch is fitted on the case and protects one or both boards. Read protect link again fitted to both boards. The installation of the unit is simple and should take no longer than 15 mins. The second card 1 min.

COST	**Unit complete 1 Board**	**£75.00 (VAT £11.25) TOTAL £86.25**
	Second Board	**£29.00 (VAT £4.35) TOTAL £33.35**
	Post	**£3.00**

THE 16/32K SIDEWAYS RAM CARD



A neat board constructed with high quality components and small enough to fit under the keyboard. Easy to fit (no soldering), comes complete with 16K of sideways RAM with two additional sockets to upgrade to 32K. Plugs into socket 12 or 15 in BBC and compatible with Schools Econet. A write protect switch is fitted which can be mounted either in reset space rear of case or in LED position right hand front of keyboard. Write protect is used to prevent corruption of data.

Sideways RAM is intended to run sideways ROM software under development, which can be kept on disc and loaded to RAM by simply typing *LOAD(NAME)8000. The RAM can be loaded 16K at a time. Compatible with H.C.R. external ROM/RAM unit.

Software is available on customers disc free of charge and consists of ● Printer buffer including help program ● Comprehensive menu program allowing simultaneous display of disc files, sideways ROMs and sideways RAM. Sideways ROM or RAM may be saved to file, RAM can be loaded from file.

Also included ROM Manager capable of enabling or disabling any ROM including sideways RAM and will survive a hard break.

EDUCATIONAL DISCOUNTS ARE GIVEN ON APPLICATION.

COST:	**Complete with 16K of sideways RAM**	**£29.00 (VAT £4.35) TOTAL £33.35**
	Complete with 32K of sideways RAM	**£35.00 (VAT £5.25) TOTAL £40.25**
	Upgrade from 16K to 32K	**£9.00 (VAT £1.35) TOTAL £10.35**

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ROM NUMBER
ROM TITLE
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BCPL
EXMON
TOOLKIT
DFS
WORDWISE
GRAPHICS EXTENSION
BBC
GIANT
TEXT
Total files 58
Level

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If you're looking for a high resolution colour monitor for your BBC micro, this special Mitsubishi offering from Opus Supplies could be just the contrast you've been waiting for. It's been designed to provide the crispest display no matter how variable the light or shade available. Unlike most high resolution colour monitors the Mitsubishi features both brightness and contrast controls which together with its anti-glare screen ensure a perfect, pin-sharp picture for both character and graphic displays in even the most demanding conditions.

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Our price of just **£249.95 + VAT** is inclusive of all connection leads, free ex stock delivery and a full 12-month warranty. The Mitsubishi colour monitor is suitable for use with the BBC, Electron, Amstrad, Commodore and most leading micros. Ring us now on **0737-65080** for details of your nearest dealer or simply post the coupon. Unbeatable dealer, education and government discounts available on request.

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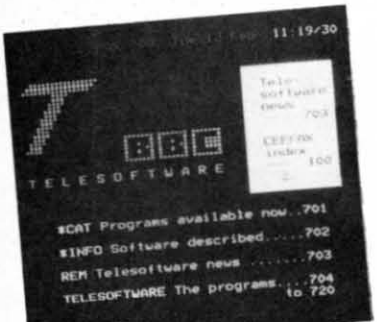
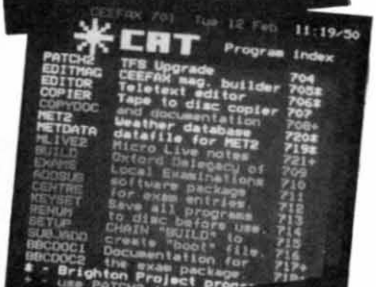
BMU4

MORLEY ELECTRONICS

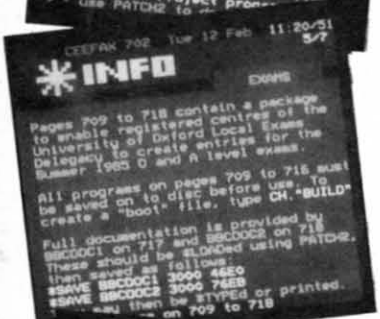


```
                         Tue 12 Feb  11:19/30
                                    Tele-
                                    software
                                    news
                                        703
                                    CEEFAX
                                    index
         BBC                            100
T E L E S O F T W A R E

*CAT Programs available now..701
*INFO Software described.....702
REM Telesoftware news .......703
TELESOFTWARE The programs....704
                           to 720
```



```
     CEEFAX 701  Tue 12 Feb   11:19/50
  *CAT      Program index
PATCH2    TFS Upgrade
EDITMAG   CEEFAX mag. builder 704
EDITOR    Teletext editor     705#
COPIER    Tape to disc copier 706#
COPYDOC   and documentation   707
MET2      Weather database    708+
METDATA   datafile for MET2   720#
MLIVE2    Micro Live notes    719#
BUILD     Oxford Delegacy of  721+
EXAMS     Local Examinations  709
ADDSUB    software package    710
CENTRE    for exam entries.   711
KEYSET    Save all programs   712
RENUM     to disc before use. 713
SETUP     CHAIN "BUILD" to    714
SUB.ADD   create "boot" file. 715
BBCDOC1   Documentation for   716
BBCDOC2   the exam package.   717+
# - Brighton Project progr    718+
+ - use PATCH2 to
```

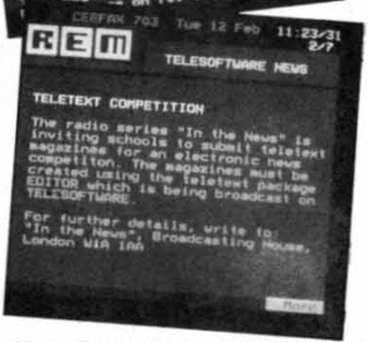


```
  CEEFAX 702  Tue 12 Feb  11:20/51
                               5/7
*INFO               EXAMS

Pages 709 to 718 contain a package
to enable registered centres of the
University of Oxford Local Exams
Delegacy to create entries for the
Summer 1985 O and A level exams.

All programs on pages 709 to 716 must
be saved on to disc before use. To
create a "boot" file, type CH."BUILD"

Full documentation is provided by
BBCDOC1 on 717 and BBCDOC2 on 718
These should be *LOADed using PATCH2.
then saved as follows:
*SAVE BBCDOC1 3000 46E0
*SAVE BBCDOC2 3000 76E8
      may then be *TYPEd or printed.
            on 709 to 718
```

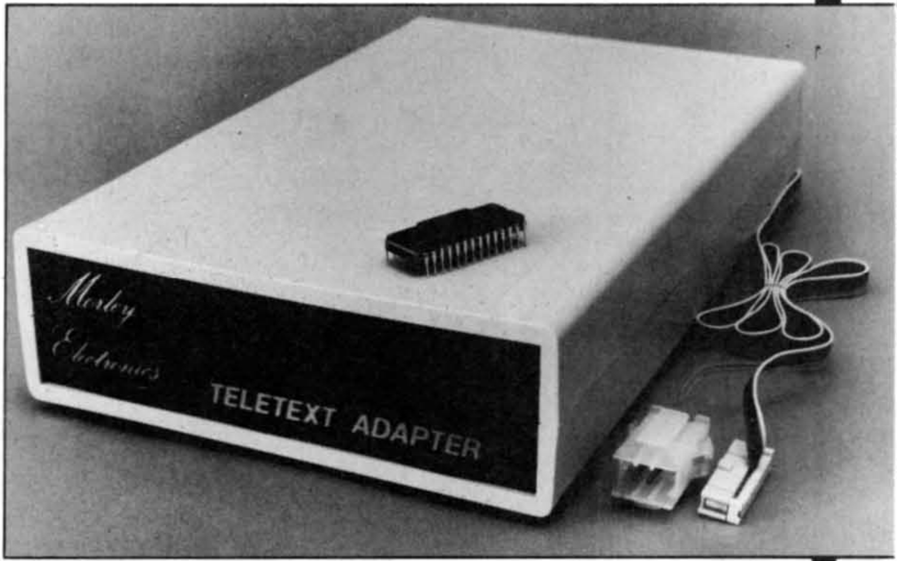


```
    CEEFAX 703  Tue 12 Feb  11:23/31
                                 2/7
REM        TELESOFTWARE NEWS

TELETEXT COMPETITION
The radio series "In the News" is
inviting schools to submit teletext
magazines for an electronic news
competiton. The magazines must be
created using the teletext package
EDITOR which is being broadcast on
TELESOFTWARE.

For further details, write to:
"In the News", Broadcasting House,
London W1A 1AA

                               More
```



FEATURES

- Advanced design uses the latest technology will handle ANY future enhancements to the Teletext system eg: full field: 8 bit data transfer: 2k pages etc.
- Simply plugs into user port and power output.
- Low power consumption, less than 200ma. Optional power supply available.
- User friendly menu driven software including extended OSCLI and Osword commands for access from BASIC programs.
- No user-RAM required (PAGE remains at default value).
- FREE Telesoftware, no access charges. (at present updated weekly.)
- Save selected pages to disc/tape for later retrieval.
- Full access to all Teletext services and channels eg: CEEFAX, ORACLE, 4-TEL.
- Software available on ROM or sidewavs RAM format disc.
- Basic 1 & OS1.0 compatible.
- Gives you a real-time clock at your disposal (*TIME).
- Free software upgrades to allow for any enhancements to the teletext service. Eg: extra channels, full field data on cable & satellite systems etc.
- Easy to follow comprehensive user guide.
- No hardware limitations, it can for example receive virtually unlimited numbers of channels.
- Works with Solidisc SWR.
- Utils disc available including printer drivers allows pages to be selected and dumped direct to a printer (no more TV or Radio Times to buy).

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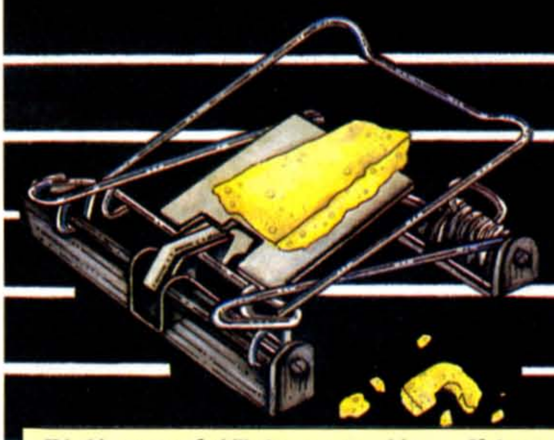
MOUSETRAP



By GEOFF TURNER

IN this game of skill the mouse – it's actually a dot – is bouncing its way around the screen trying to eat up pieces of cheese.

The object is to force the hungry rodent into the trap at the top left hand corner of the screen by drawing lines with the Z, X, : and / keys.

Unfortunately there is only a limited length of line, indicated by the reducing number at the bottom of the screen.

If the mouse becomes trapped on the wrong side of the line you have failed and it will be necessary to clear away all the lines drawn by pressing the spacebar.

In trying to trap the mouse, you must also prevent it eating the cheese because when it does so all the lines already drawn on the screen will clear.

One strategy worth adopting is to surround each piece of cheese in turn while heading the mouse away from any other pieces. Also you could try creating thin corridors in which to herd the mouse. But beware of making the corridor too narrow or the mouse will get stuck.

The game ends when the mouse is trapped for at least three seconds, or you have used up all your line. Happy mousehunting – and good luck. You're going to need some.

PROCEDURES

instructions	Displays instructions.
cheese	Places cheese in random positions.
line	Detects direction and draws line.
test	Checks for collisions.
clear	Clears away drawn lines.
time	Checks if mouse is trapped for three seconds.
win	Ends the game if you win.
lose	Ends the game if you lose.

VARIABLES

V%	Mouse's vertical movement.
H%	Mouse's horizontal movement.
L%	Amount of line left.
E%	Game over flag.
XL%	Line's horizontal position.
YL%	Line's vertical position.
X%	Mouse's horizontal position.
Y%	Mouse's vertical position.
XX%	Mouse's new horizontal position.
YY%	Mouse's new vertical position.
CX%	Cheese's horizontal position.
CY%	Cheese's vertical position.

Full listing starts on Page 111

How to change your Epson's image – a bit at a time

Part two of ROBIN NIXON's series on designing your own customised characters

LAST time we examined ways of exploding user-defined character definitions. This month we will look at how to print these characters on an Epson compatible printer.

You should by now have created your own character set. But don't worry if you haven't because the technique works equally well with the BBC Micro's own character set.

The technique by which you can get an Epson to print out any character definition is called bit imaging. Once bit image mode has been initialised, in place of sending the Ascii value of a character to the printer the character's definition is sent – a byte at a time.

This definition works in a similar manner to VDU 23 except that the character needs to be rotated through 90 degrees. This is because the pins on a dot matrix printer are arranged vertically rather than horizontally as you will see from Figure I.

You may also notice that the Epson has nine dot wires. The ninth is used for underlining and lower case descenders. As descenders and underlining are kept within the 8×8 character cell on the BBC Micro the ninth wire is not used in bit image mode.

Let's have a look at how we would print the character A.

To define the character A as a user-defined character, assuming it doesn't already exist, we would type the command:

```
VDU 23,65,56,108,108,198,254,
198,198, 0
```

The result can be seen in Figure II. So far, so good. But as the character has to be rotated to the left by 90 degrees for the bit image definition (see Figure III) we have to send the following sequence to the printer.

```
30,126,232,136,232,126,30,0
```

Before we send the rotated A, however, we must first tell the printer to go into bit image mode by sending the escape sequence:

```
1,27,1,75
```

The 1 before the 27 and 75 tells the computer to send the next byte to the printer only. The 27 tells the printer that an escape sequence is to follow and the 75 is ASC"K" which instructs the printer to go into bit image mode.

Next we must say how many bytes of bit image information are to follow so that the Epson knows when to go back to normal printing, and doesn't confuse character data with bit image data.

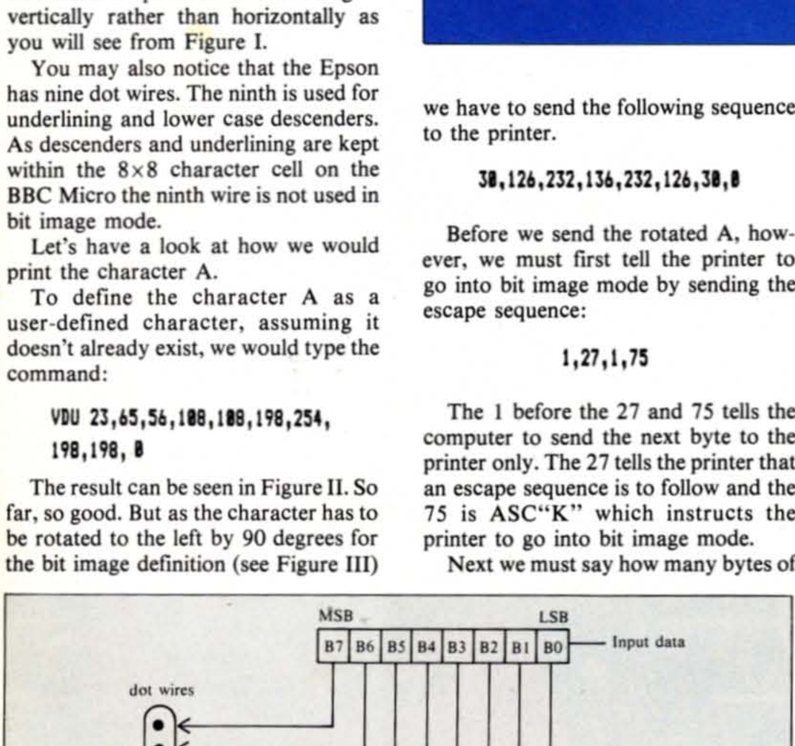


Figure I: Relationship between data and dot wires

In the case of the letter A this is eight bytes because we are only sending the one character, which has a definition made up of eight bytes. Because there may be more than 256 bytes of data, the format we send this number in is the low byte followed by the high byte.

```
   10 REM ** Program to print 'A'
   20 REM ** on an Epson printer.
   30 VDU 2:REM Printer on
   40 VDU 1,27:REM ** Escape to print
er
   50 VDU 1,ASC("K"):REM ** Bit image
 mode
   60 VDU 1,8,1,0:REM ** Number of by
tes to send
   70 REM ** 8=low byte, 0=high byte
   80 REM ** So 8 bytes altogether
   90 VDU 1,30,1,126,1,232,1,136,1,23
2,1,126,1,30,1,0
  100 REM ** Definition data
  110 VDU 3:REM ** Printer off
  120 END
```

Program I

So, if you take a look at Program I you will see that lines 40 to 60 initialise the printer to bit image mode and

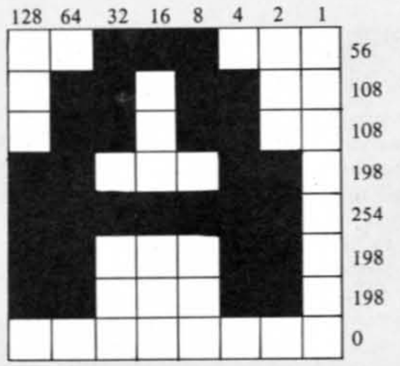


Figure II: The character definition of A held in the BBC Micro

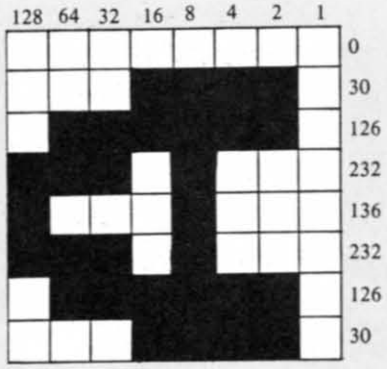


Figure III: The definition as it must be sent to an Epson printer (reading from bottom to top)

prepare it for eight bytes of data. Then line 90 sends the data for the character A which is then printed out.

Program II, Anyprint, assembles the program Driver which, when *RUN or called, intercepts the print vector OSWRCH and waits for a VDU 2 – printer on – ignoring anything else. When a VDU 2 is received all following bytes are assumed to be printable characters.

The definitions of these characters are then looked up using OSWORD &A, rotated and sent to the printer. This means that no matter what characters you've defined, they will be printed out.

When run, Anyprint asks you for an address to assemble to. If you have a disc-based system &1100 is a good place to store the code. If your micro is cassette-based, raise PAGE to &1000 before you type or load in Anyprint. Then answer E00 to the start address.

Remember, if you press Break the utility will be destroyed and you'll have to reload it. Thereafter if your micro is tape based, when Driver is in memory ensure you set PAGE to &1000 before loading any programs or it will be overwritten.

I hope you find Anyprint useful and would be interested to see any novel uses you make of it. For example with a little ingenuity you could adapt it to give a Mode 7 screen dump.

● ***Next month we'll be looking at how to define a squashed character set and manipulate the video ULA to get 40 characters a line in Mode 2.***

Program II

```
100 REM ************************
110 REM *                      *
120 REM *      ANYPRINT        *
130 REM *                      *
140 REM *   By Robin Nixon     *
150 REM *                      *
160 REM * (c) The Micro User   *
170 REM *                      *
180 REM ************************
190 REM
200 MODE 7
210 chartable=&80
220 INPUT "Enter address to assembl
e to (in hex)"'"&"A$:A$="&0"+A$:START
=EVAL A$
230 FOR PASS=0 TO 3 STEP 3
240 P%=START
250 [
260 OPT PASS
270 \
280 .init
290 \
300 LDA &20E
310 STA &70
320 LDA &20F
330 STA &71
340 LDA #start MOD &100
350 STA &20E
360 LDA #start DIV &100
370 STA &20F
380 LDA #0
390 STA &72
400 STA &74
410 STA &7C
420 STA &7F
430 RTS
440 \
450 .start
460 \
470 PHA
480 LDA #1
490 CMP &74
500 BNE noskipflag
510 PLA
520 JMP (&70)
530 \
540 .noskipflag
550 \
560 PLA
570 STA &73
580 CMP #2
590 BNE notprinteron
600 PHA
610 LDA #1
620 STA &72
630 PLA
640 JMP (&70)
650 \
660 .notprinteron
670 \
680 CMP #3
690 BNE notprinteroff
```

Turn to Page 113

Give your type 192 new fonts

You can set it sideways, too!

By PETER GAUNT

SOME of the more recently introduced micros are able to use several different styles of lettering, and this can be used to good effect to make their displays more attractive.

This program will add a similar facility to the BBC Micro in Modes 0 to 6. The code can be used with almost any program and is fully compatible with the 6502 second processor.

The styles available are normal, italic, feint, underlined, sideways, reversed, double width and any combination you like. You could if you wished produce double width, feint, underlined, sideways and reversed print.

Sideways print is useful for doing things such as labelling the axes of graphs. Reversed print does not print letters backwards but reverses the background and foreground colours.

The fonts are selected using an OSBYTE (*FX) command and can be toggled on and off.

The only effect that the presence of the code has on normal printing and graphics is to slow it down by around one per cent (only about half a per cent with the 6502 second processor). You must also make sure that you don't use character 255 as this is used by the code. The new fonts themselves print at around one tenth the normal speed, but even so are not exactly slowcoaches.

Before you can use the code though you'll have to type in and save Program I. If you run the program in 6502 second processor you must set PAGE to &B00 or above before you do so otherwise the code will overwrite the program as it assembles.

When it has run the object code will be saved to disc or tape as a file called *FONTS*. The top two bytes of the load address will be set to &FFFF so that it will load into the I/O processor when used with a second processor.

The code occupies &900 to &AEE which is quite safe so long as you don't intend using the cassette filing system, the RS423 interface, the speech processor or envelopes 5 to 15. If you do intend using any of these you will have to locate it elsewhere. This is explained later.

When you want to use *FONTS* just enter *RUN FONTS (*FONTS will do from disc). Don't *RUN it again without pressing Break. If you're using it from tape *RUN FONTS must be the last use your program makes of the cassette system unless you've relocated it.

If you are using discs and a second processor note that some DFSs can't run code properly in the I/O processor and you'll have to switch to Acorn DFS.

The different fonts can then be turned on and off using *FX1 or *FX241, which is the same as *FX1 when used without a Y parameter.

When you first run *FONTS* all printing will be normal. *FX1 writes to a location in RAM at &281 whose bits are used to turn on and off the various fonts. If bit 0 of this location is set to zero the computer will print normally regardless of the setting of the other bits. The bits are arranged as follows:

Bit 0	(1)	normal print if zero.
Bit 1	(2)	italic.
Bit 2	(4)	feint.
Bit 3	(8)	underline.
Bit 4	(16)	reversed.
Bit 5	(32)	sideways (letters rotated clockwise)
Bit 6	(64)	sideways (letters rotated anticlockwise).
Bit 7	(128)	double width.

The numbers in brackets are the bit value. Thus to switch all output to italics you should use *FX1,3 to turn on bits 0 and 1, for italic underlined use *FX1,11 to turn on bits 0, 1 and 3.

Remember that bit 0 must be on before any of the other flags have any effect. If you turn on both bits 5 and 6 then bit 5 will be ignored since sideways anticlockwise has priority. *FX1,0 will turn off all the flags and return you to normal printing

*FX241 can be used to turn individual bits on and off without affecting any of the others by setting the Y parameter to 255.

For instance, if bit 0 is on and you use *FX241,1,255 it will be turned off returning you to normal print. If you then use *FX241,1,255 again bit 0 will be turned back on and print will return to whatever it was before you turned it off. In other words *FX241,X,255 toggles the bits. If they're on it turns them off and if they're off it turns them on.

You can also toggle the flags on and off within print statements by including some of the less used characters in the statement so long as bit 0 is turned on.

The following characters are used for toggling in PRINT statements:

/	italics
I	feint
_	underline
(	reversed
[	sideways (clockwise)
]	sideways (anticlockwise)
)	double width

So, for example, the following will print with the word fox underlined, double width and the word lazy in double width, feint italics:

```
*FX 1,1
PRINT"The quick brown }_fox_} jumps
over the }¦\lazy¦\} dog"
```

You can still print any of the toggle characters on the screen but only in normal print by turning bit 0 off. If you want to use different characters for toggling then change the DATA list in line 3530.

Program II shows in more detail how to use Fonts in a simple program.

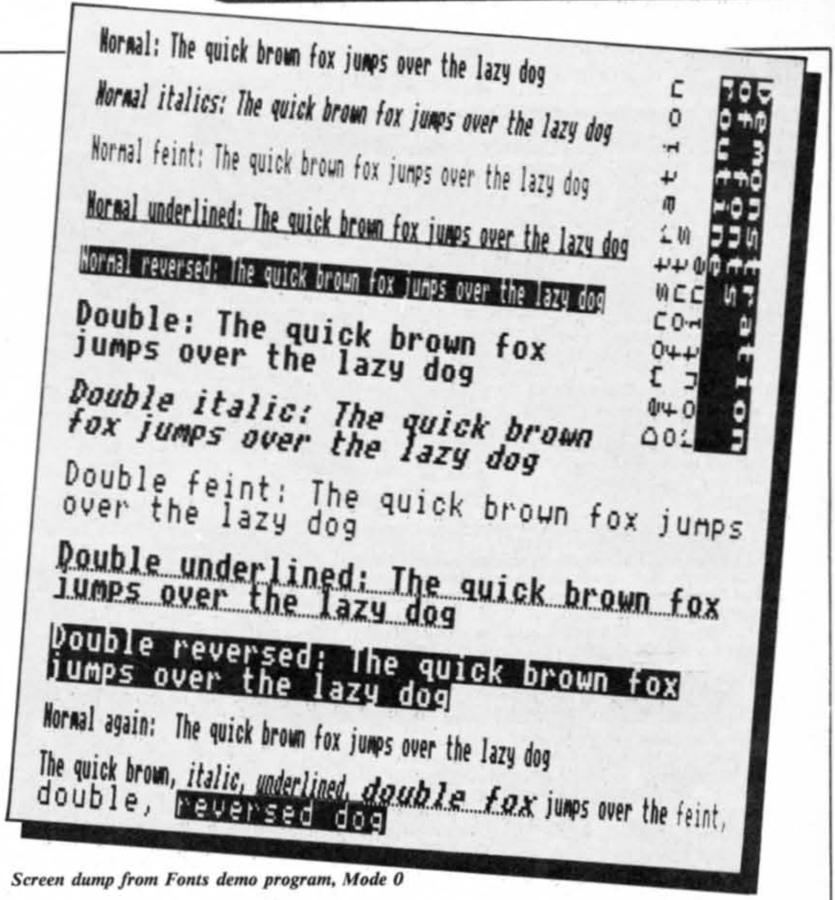
The Delete key works normally on all fonts except sideways. If you try to use the Copy key on any of the new fonts you'll find it won't work and the computer will just beep. Copy only works on normal print.

Machine code freaks will find that using OSBYTE 135 to read a character from the screen won't work on the new fonts either, as it nearly always returns zero. Before using a printer you must make sure that bit 0 is turned off, otherwise all sorts of very peculiar things may happen.

Sideways printing is restricted to one line (column) of printing. If you want to print more than one line you'll have to use the PRINTTAB(X,Y) command.

The code works by intercepting the OSWRCH vector which is used every time the operating system writes a character to the screen. If bit 0 is off or the character is a non-printing one the code jumps to the normal OSWRCH routine in the operating system and prints normally.

If bit 0 and any of the other flags are set the character definition is read using OSWORD &A and the definition is altered. Character 255 is redefined using the altered bytes before being printed.



```
Normal: The quick brown fox jumps over the lazy dog
Normal italics: The quick brown fox jumps over the lazy dog
Normal feint: The quick brown fox jumps over the lazy dog
Normal underlined: The quick brown fox jumps over the lazy dog
Normal reversed: The quick brown fox jumps over the lazy dog
Double: The quick brown fox
jumps over the lazy dog
Double italic: The quick brown
fox jumps over the lazy dog
Double feint: The quick brown fox jumps
over the lazy dog
Double underlined: The quick brown fox
jumps over the lazy dog
Double reversed: The quick brown fox
jumps over the lazy dog
Normal again: The quick brown fox jumps over the lazy dog
The quick brown, italic, underlined, double fox jumps over the feint,
double, reversed dog
```

Demonstration of fonts routine
Demonstration of fonts routine

Screen dump from Fonts demo program, Mode 0

Italics are produced by rotating all the bits in the top three bytes of the character definition to the right and the three lower bytes to the left. You could try altering the way the characters are played around with if you like and maybe come up with some different fonts.

If you need to locate the code somewhere else because you want to use the cassette interface or RS423 you'll have to find two spare pages in memory for it to live. Probably the best way would be to raise PAGE by &200 and locate it at the old PAGE.

This is probably a good idea anyway if you're using a second processor since there's plenty of spare RAM in the I/O processor and it seems a bit silly to leave the code at &900.

If you put the code in normal RAM you'll have to raise OSHWM by &200 if you are using discs, otherwise commands such as *COPY will have dire consequences. You can get *FONTS* to do this for you by adding the following four lines to the end of the swap routine between lines 520 and 530. Line 3560 should also be deleted.

```
LDA #180
LDX #new  \ see below
LDY #0
JSR osbyte
```

Before you do this you'll have to find the old value of OSHWM. In my BBC Micro with second processor and two DFSs it's at &2100, but this will vary depending on what ROMs you have installed.

To find its value enter the following directly from the keyboard:

```
DIM B% 3:A%=180:X%=0:Y%=&FF:!B%=USR
&FFF4:PRINTB%?1
```

This will print out the high byte of OSHWM in decimal. Add two to this number and use it in place of new above. Return Program I making sure that the code isn't going to assemble over the top of it. Now when you *RUN FONTS the value of OSHWM will be changed to the new value.

You should find *FONTS* a useful program for making your screen displays more appealing. I now use it in nearly every program I write to, I hope good effect.

Full listing starts on Page 108

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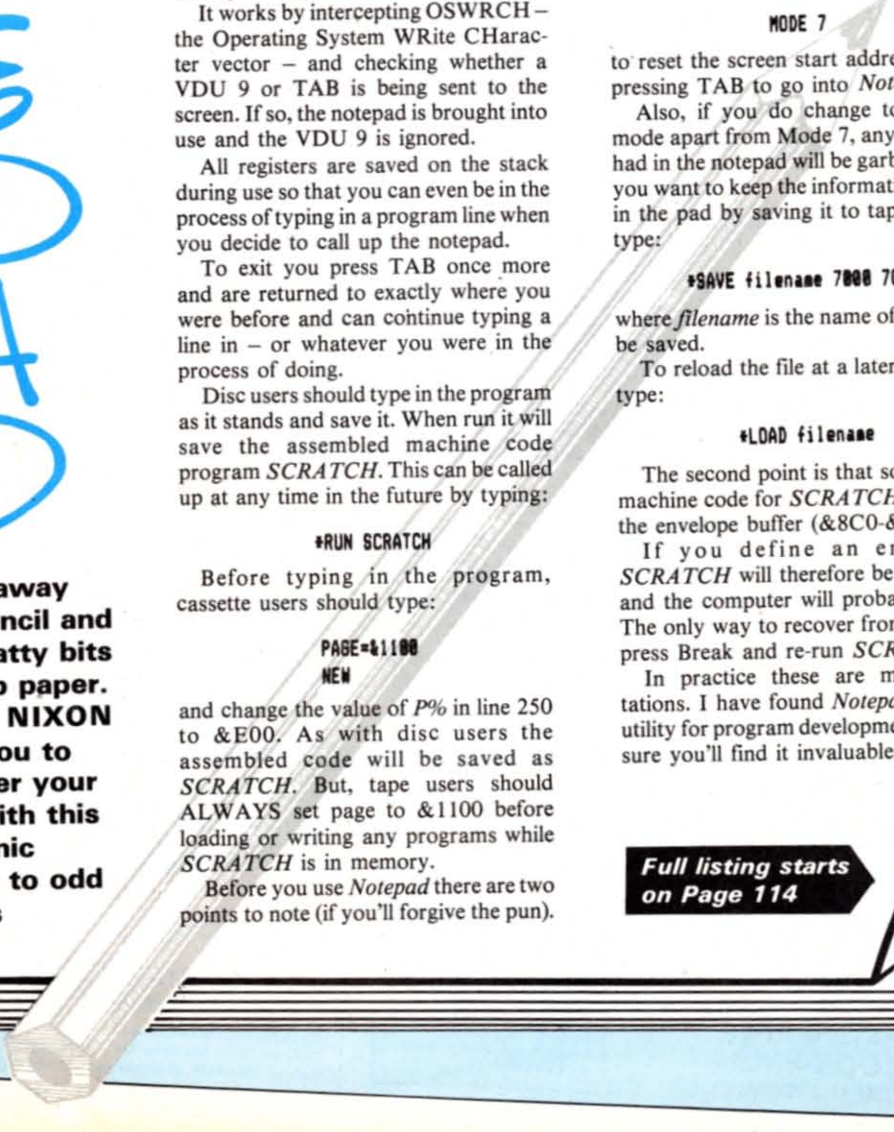
NOTEPAD

Throw away your pencil and those tatty bits of scrap paper. ROBIN NIXON helps you to unclutter your desk with this electronic answer to odd jottings



I DON'T know about you but when I'm programming I usually find I get through reams of scrap paper as I jot down various locations, screen coordinates, variable names and so on.

And of course, life being the way it is, that valuable scrap of paper which contained my latest mega-fast sprite routine will have disappeared five minutes after I put it down. To help solve this problem – and unclutter my desk – I wrote *Notepad*.

The idea of this program is that, at the expense of 4k of RAM, a notepad is tucked in just under the start of screen RAM.

This pad holds three screens full of information which can be scrolled through using the cursor keys.

It works by intercepting OSWRCH – the Operating System WRite CHaracter vector – and checking whether a VDU 9 or TAB is being sent to the screen. If so, the notepad is brought into use and the VDU 9 is ignored.

All registers are saved on the stack during use so that you can even be in the process of typing in a program line when you decide to call up the notepad.

To exit you press TAB once more and are returned to exactly where you were before and can continue typing a line in – or whatever you were in the process of doing.

Disc users should type in the program as it stands and save it. When run it will save the assembled machine code program *SCRATCH*. This can be called up at any time in the future by typing:

```
*RUN SCRATCH
```

Before typing in the program, cassette users should type:

```
PAGE=&1100
NEW
```

and change the value of *P%* in line 250 to &E00. As with disc users the assembled code will be saved as *SCRATCH*. But, tape users should ALWAYS set page to &1100 before loading or writing any programs while *SCRATCH* is in memory.

Before you use *Notepad* there are two points to note (if you'll forgive the pun). Firstly, so that the BBC Micro can scroll quickly when printing text the screen is hardware scrolled. This means that the start position of the screen is incremented by 40 characters each time a scroll is required, thus saving the need to copy large chunks of text merely to move it all up a line.

However this causes problems when you try to copy information to and from the screen so the program defines a text window of the exact size and dimensions of a Mode 7 screen. Thereafter when the screen scrolls it will be a software scroll and the start position of the screen will remain in the same place.

So, if you remove the window by changing mode or defining a new window, be sure to type:

```
MODE 7
```

to reset the screen start address before pressing TAB to go into *Notepad*.

Also, if you do change to another mode apart from Mode 7, anything you had in the notepad will be garbled. So, if you want to keep the information stored in the pad by saving it to tape or disc, type:

```
*SAVE filename 7000 7C00
```

where *filename* is the name of the file to be saved.

To reload the file at a later date, just type:

```
*LOAD filename
```

The second point is that some of the machine code for *SCRATCH* is held in the envelope buffer (&8C0-&8FF).

If you define an envelope, *SCRATCH* will therefore be destroyed and the computer will probably crash. The only way to recover from this is to press Break and re-run *SCRATCH*.

In practice these are minor limitations. I have found *Notepad* a useful utility for program development and I'm sure you'll find it invaluable.

Full listing starts on Page 114

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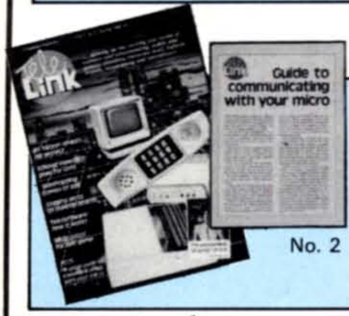
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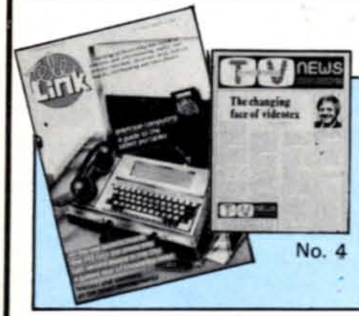
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Computer type .... (CBM64/BBC/Electron/Spectrum/Amstrad)
Mr/Mrs/Miss ....
....
.... Postcode ....

Who can save the universe?

Program: Dr Who and the Mines of Terror
Price: £18.95 (cassette and 16k ROM), £19.95 (disc and 16k ROM)
Supplier: Micro Power, Northwood House, North Street, Leeds LS7 2AA. Tel: 0532 458800

THE latest release from Micro Power, **Dr Who and the Mines of Terror** combines the best in arcade and adventure games.

Your old adversary, the Master, has taken over one of the moons of the planet Rijar.

The mining complex he is using as a base is used to extract Heatonite, a rare mineral used in the building of a Time Instant Replay Unit (TIRU).

He proposes to build his own TIRU to aid him in his plans to conquer the universe and what's more, he intends using your brain to make it more powerful.

Can you, as the Doctor, put an end to his plans?

You have two types of adversaries to avoid or outwit in your task, the Controllers, Dalek-like machines that sense your presence if you get too near, and Madrags, large monsters that are either fully grown or waiting to be hatched.

To get past the eggs you need the help of your Splinx, a semi-intelligent robot programmed to perform simple tasks from a menu.

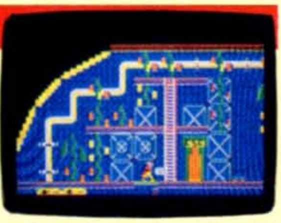
Movement around the moon is by use of platforms and ladders, and a central lift provides access to all sections of the complex.

There are two ways to get to this lift – both very dangerous and requiring split second timing. You either find out how to pass the Madrag or find your way past the Controllers.

In the latter case, you'll find that it takes a lot of practice. You score points by reaching machines with CCS written on them.

I have explored a lot of the complex but I still haven't managed to get my timing right for the third jump necessary to by-pass the Madrag, so I can't get the air bottle needed to go on to the moon's surface.

Neither can I work out the combination necessary to get into the safe that houses the pass card allowing you to get through the locked doors.



Documentation, which includes a briefing manual, cross-sectional map and an explanation of how to get past the Madrag. is comprehensive and very well presented.

The graphics are not as good as those of Castle Quest and I found them jerky on occasion. Considering the number of things going on though, I am surprised they are as good as they are.

How they managed to pack so much into this magnificent program is a source of amazement and the inclusion of an eprom makes the package especially good value.

Paul Gardner

Sound	4
Graphics	7
Playability	9
Value for money	7
Overall	7

Take a chance with Leisure Genius

Program: Monopoly
Price: £12.95 (cassette), £14.95 (disc)
Supplier: Leisure Genius, 3 Montagu Row, London W1H 1AB. Tel: 01-935 4622

OFTEN when an established board game is transferred to the computer something seems to be lost in the translation.

The computer edition of **Waddington's Monopoly** by Leisure Genius is an exception to this rule.

A tape or disc version of the game is available and the comprehensive instruction booklet sets out the object and rules, which are all as in the original game.

A key strip is provided for the function keys and a miniature layout of the proper board is also provided.

Two to six persons can play at one time, with an option for the computer to take the part of any or all of the players.

Each player enters his or her name then selects a token. The dice are then rolled and the player with the highest total starts the game.

One or two points are worthy of special mention.

All the rules are strictly enforced by the computer, thus ending the usual inter-player arguments that crop up in games of Monopoly.

If you land on another player's property, the owner's token appears on the screen against that property reminding him to claim the rent.

When a player does not take the opportunity to purchase the property on which he has landed a fast and furious auction is held.

There is a facility to engage in negotiations with other players. If a player has a cash flow problem a mortgage can be arranged through the bank, a part always played by the computer.

The graphics are simple but effective with four board squares being displayed from the top to the bottom of the screen. The squares are scrolled up for each move with an accompanying bleep.

The houses and hotels are simple but striking, and the property deeds are displayed when a property is bought.

The computer edition of Monopoly is well written and even more addictive than the board game.

Alan Cockman

Sound	2
Graphics	8
Playability	10
Value for money	9
Overall	9

Heavy breathing

Program: Hypersports
Price: £12.95 (disc only)
Supplier: Imagine, 6 Central Street, Manchester M2 5NS. Tel: 061-832 6633

HYPER Sports is a compilation of six sporting events. The qualifying standard must be achieved in each event before you are allowed to progress to the next one.

Event number one is the 100 metres freestyle swim. The competitor is powered by rapidly pressing the Z and / keys. All would be fine if it were not for your little swimmer's insistence on breathing at regular intervals.

Every 10 metres the message Breathe flashes in front of him and in response you must press the spacebar.

A mistimed breath results in a mouthful of water and a stationary swimmer.

Having qualified in the aquatic event you next display your marksmanship in the skeet shooting. Owners of Acorn speech synthesisers must remove the chips before this event will function correctly.

I found the third event, the long horse, to be the most difficult.

A little man runs towards the springboard automatically. As he reaches it you must press the spacebar, and up he flies in a graceful arc heading for the horse.

Another quick dab at the spacebar as he reaches the horse and he heads skyward once more.

Now is the time to begin bashing the other two keys to cause him to perform multiple somersaults, thus boosting your points.

I failed to qualify for the archery, triple jump, or weight lifting events, but if they are half as entertaining as the first three, Hyper Sports is value for money.

Carol Barrow

Sound	5
Graphics	8
Playability	8
Value for money	8
Overall	8

Step in for Daley Thompson

Program: Olympic Decathlon
Price: £9.95 (disc only)
Supplier: Alligata, 1 Orange Street, Sheffield S1 4DW.
Tel: 0742 755796

EVER fancied stepping into Daley Thompson's shoes and competing in the Olympic games? Now is your chance.

In **Olympic Decathlon** from Alligata Software you can try your hand at the 10 events of the decathlon.

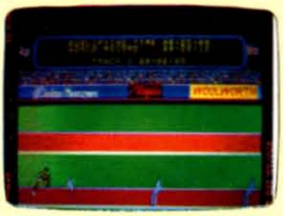
The crowds look on, the flags wave in the wind and a merry little ditty plays while you decide which events to tackle.

In the 100 metre sprint you compete against another athlete, though you must beat the qualifying time to get to the next event. If you beat the world record a message of congratulations appears on the screen. Later there are both 400 metre and 1500 metre runs.

In the long jump you run up to the board and press jump at the last possible moment. Leave it too late and you get a foul – three fouls and you're out of the games.

The longer you hold the jump button down, the greater will be the angle of your jump.

Now for the shot putt, where you control when the athlete throws the shot and at what angle. To throw the javelin you run up to the line and throw at the last possible moment. The hurdles, pole vault and high jump provide the added requirement of jumping to perfection as well as running.



The program is disc based and loads each event separately. This allows for features previously not seen on a BBC Micro because of lack of memory. The graphics are stunning and the animation is some of the best I've seen.

Sound is sparse but adequate.

Control is by keyboard or joystick, though I found keyboard easier because you can define the keys.

The game is easy to play but difficult to master. In my opinion this is one of the best games of its type and considerably less tiring than the real thing.

Phil Tudor

Sound	*5*
Graphics	*9*
Playability	*8*
Value for money	*8*
Overall	*8*

Solve an enigma

Program: Star Drifter
Price: £3.95 (cassette)
Supplier: Firebird, Wellington House, Upper St. Martin's Lane, London WC2H 9DL.
Tel: 01-379 6755

IN the latest release in the Super Silver range from Firebird Software, an ancient ship of the doomed galactic colonisation programme has mysteriously entered Earth space.

You must enter this ghostly ship, which is full of non-humanoid life, to solve the enigma of **Star Drifter.**

You start in the bridge which, like all the rooms, has circuit boards, dials and switches plastered on the walls.

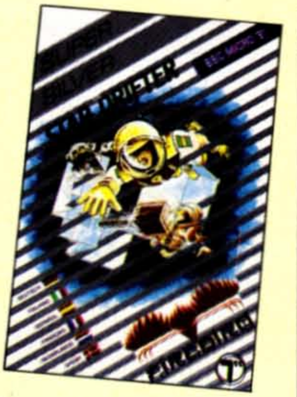
The first job is to find a gun to fend off the marauding aliens that frequently hustle up to you.

You have three lives and a limited supply of oxygen which gets lower if you bump into an alien.

Scattered about the ship are objects such as floppy discs, potions and a tool box, which yield a bonus when found.

The hyper-zap gun and the oxygen replenishing oxygenator are especially useful.

You are instructed what to look for so you're not totally in the dark. The major difficulty is that certain corridors are sealed by doors requiring keys to get through. Other blockages even need blasting away with a bomb.



The hardest part of the game is moving the keys around the 120 rooms, since you can only carry three things.

Sound is fantastic but optional, with all the usual blasts, pings and tinkles.

The graphics are detailed, with each room shown in plan view on the screen and animation is smooth with large distinct characters.

Star Drifter is great fun, addictive and kept me hooked for hours at a time.

Phil Tudor

Sound	*8*
Graphics	*9*
Playability	*9*
Value for money	*9*
Overall	*9*

Manager in Mexico '86

Program: Mexico '86
Price: £9.95 (cassette), £12.95 (disc)
Supplier: Qualsoft, 18 Hazelmere Road, Stevenage, Herts. SG2 8RX. Tel: 0438 721936

A FEW months ago I was introduced to the delights of football management on the BBC Micro, and have often frittered away a few hours moving up and down through the divisions.

But now, in **Mexico '86,** the ultimate challenge has been offered me, that of managing the England football team and guiding them safely to Mexico.

Actually the path begins with a couple of friendlies against France and Russia, followed by the South American tour.

At the end of these first matches the squad is assembled and ready to take on the qualifying group. Obviously some matches do not directly involve England, and these games are "played" by the computer, with a few strange results occurring.

At each England match the team and reserves can be selected, thus the formation of the team may be decided by the manager.

There are opportunities to make tactical alterations and substitutions, and the game is played out automatically on the screen by 22 little men moving up and down the pitch in a reasonably realistic manner.

There are five levels of play, and further interest may be introduced by the inclusion of more dimensions for the computer to interrogate the player's choices.

When England eventually qualify the position is saved on to a blank cassette, which is then loaded into a second program dealing with the final stages.

These follow an authentic pattern, although there is a disappointingly short message when the trophy is eventually won.

The sound effects are rudimentary, but can be controlled, while the graphics are quite acceptable for a program of this complexity.

Apart from the point at which qualification is reached, there is no other option to save the position, which is a glaring omission.

Otherwise there's plenty to keep the football fan happy until Mexico '86.

Pat Hillery

Sound	*2*
Graphics	*4*
Playability	*5*
Value for money	*5*
Overall	*4*

Lively but late

Program: Fat Man Sam
Price: £3.95 (cassette)
Supplier: Firebird, Wellington House, Upper St. Martin's Lane, London WC2H 9DL. Tel: 01-379 6755

FAT Man Sam is a Super Silver release from Firebird Software, which means that it isn't as cheap as most of their stuff but should be much better.

Taking the now familiar format of Manic Miner, you guide Fat Sam around 40 screens collecting objects as they appear.

The screens themselves consist mainly of platforms and creatures floating to and fro. You jump from platform to platform, collecting your objects.

Killer weed, jagged rocks and most things that move are bad news and are to be avoided.

All the graphics are well defined and the animation is most impressive.

Each screen has a certain feature that makes it unique. One for example, has two pairs of giant crushers that move up and down in sequence. You need to watch these for ages before you can figure out when to jump.

You have six lives, shown as little men who dance merrily at the top of the screen while you struggle with your current life.

Another feature is that you can start in any of the first 10 screens, which stops you getting bored if you are stuck on an early screen.

The sound can be turned off and is generally satisfactory and the music that plays during loading is a brilliant version of Roll out the Barrel that makes loading a pleasure!

The three control keys can be redefined or swapped for a joystick

I think this is a good version of the classic game, but a little late to impress people all that much.

Phil Tudor

Sound	*8*
Graphics	*7*
Playability	*6*
Value for money	*8*
Overall	*7*

Menace of the 3D plague

Program: Nightshade
Price: £9.95 (cassette)
Supplier: Ultimate Play The Game, The Green, Ashby-De-La-Zouch, Leicestershire LE6 5JU. Tel: 0530 411485

HOT on the heels of their smash hit Knight Lore, Ultimate releases **Nightshade,** yet another 3D arcade adventure game.

The program derives its name from the village of Nightshade in which the adventure is set.

Many years ago Nightshade was a tranquil little haven lying in the valley between the purple mountains and the sea. All was well until the day darkness descended on the land.

Many villagers fled for the hills, those who remained were transformed into hideously foul creatures.

Since the plague no person has entered the village, let alone dared to challenge the evil overlord.

Once again it looks as though you are on your own against the evil hordes. Just to make things that little bit more difficult you are not told where the overlord is, or how to defeat him.

No one could expect you to enter the village unarmed so you have been provided with a pocket full of antibodies. These will soon be exhausted if you fire at every reptile or blob of slime which crosses your path, so use them wisely.

You are free to wander through the streets and enter any of the buildings, but the many characters you will encounter will deplete your energy by a certain amount if you collide with them.

BBC MODEL B 1·2 OS
NIGHTSHADE
ULTIMATE

A useful tip is to collect the things which look like spinning candles. These can be used as ammunition against the enemy.

Owners of the previous Ultimate titles will be familiar with the 3D techniques used in their games.

The characters move around each other in such a way that you can sense the depth of the display.

Once again Ultimate has produced a high quality and highly taxing adventure game using tried and trusted techniques.

James Riddell

Sound	*5*
Graphics	*9*
Playability	*8*
Value for money	*8*
Overall	*8*

Give those bugs the hammer

Program: Chipbuster
Price: £7.95 (cassette), £10.95 (disc)
Supplier: Software Invasion, PO Box 68, London SW19 4TX. Tel: 01-947 8876

EVERY one of us will at some time have problems with a bug in a program, though some of us tend to have more problems than others.

Chip Buster, from Software Invasion, is a game about computer bugs. Not of the "Syntax error" variety, but the ones with six legs which munch through chips, tracks and other assorted components.

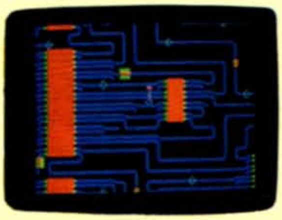
As the game begins you are given a choice of three computers. You can practice your extermination skills on the BBC B, B+, or a machine known as the crazy computer. Your decision made you are transported onto the main circuit board of your chosen micro.

Armed with the tool of your trade, a sledge hammer, you set out in search of bugs.

Your task is divided into two distinct areas, component repair and bug splatting. Both are carried out in a similar way.

Components are repaired by standing on them and hitting them with a big hammer, just like my local BBC dealer (only kidding guys!).

Bugs are a little more difficult. Touch them while they're moving and you are dead. The trick is to sneak up on them while they're chewing a chip, then whammo, exit one bug.



The repair man is only allowed to walk on the tracks or the chips themselves. This introduces an element of maze negotiation into the game. The computer screen displays only a small proportion of the circuit board. Movement in any of the four directions causes the screen to scroll smoothly in that direction.

Pressing the D key at any time will display a damage report, providing information on any areas which are currently under attack. Using the map on the inlay card you can then home in on the damaged area.

The game ends when you have lost all four lives, or every section of the board is damaged and the computer explodes.

Chip Buster will never be a blockbuster, but it provided me with several hours of entertainment. More importantly it can be played at a leisurely pace and is therefore ideal for younger children.

Jon Revis

Sound	*6*
Graphics	*7*
Playability	*8*
Value for money	*7*
Overall	*7*

Race game can be an enthralling project

Program: Cars – Maths in Motion
Price: £19 (cassette or disc + 54 page manual)
Supplier: Cambridge Software House, The Town Hall, St. Ives, Huntingdon PE17 4AL. Tel: 0480 66805

CARS – Maths in Motion is one of the better educational programs in which children aged nine and upwards can compete in a series of grand prix races where they can be driver, mechanic, weatherman and psychologist. They can choose one out of 10 different race tracks to compete at, from Detroit and Brands Hatch to Buenos Aires.

They plan the route to the track, adjust the car and carry out safety checks on tyres and oil.

Then after a few practice laps comes the big race.

The children have to make their own estimations and calculations from information given them, so there is quite a bit of understanding and use of mathematics.

The first time I tried it I spun and crashed on feature number 6, a tight bend or TB as they call it.

Quite demoralising when there are 20 features, bends and straights on the Detroit course.

Unperturbed, I went back to the drawing board and adjusted my variables at the touch of a button.

Each team does its own preparations and when the practice laps are complete you enter your final position on the grid and you're ready for the race.

Every few laps you can get a progress report of who's doing what, when, where and how. You can program the number of reports, laps, or in fact anything you want.

Good use is made of colour, graphics and sound, and the program is accompanied by a user pack containing track layouts, worksheets and manual.

There are a great many activities leading up to the race and it is crucial for children to be able to work in small groups.

This enthralling program would make a great project over a number of weeks.

David Boyd

Grid of confidence

Program: Number Games
Price: £9.95 (cassette)
Supplier: BBC Soft, 35 Marylebone High Street, London W1M 4AA. Tel: 01-927 4128

DO you find yourself intimidated by the complexities of a chess board? Then perhaps this package will give you confidence to find your way round a two dimensional grid.

Number Games provides six maths programs for children from eight years upwards and aims to improve their two dimensional spatial ability while giving practice in basic addition and subtraction.

Two of the games use the move of a chess knight and with the exception of one game they are played on a numbered grid, the object being to collect a target number or highest score.

Most offer a choice of playing against the computer or a friend and are simple to understand.

Youngsters soon discover that random moves do not bring much success and that logic and strategy help tip the odds in their favour.

The graphics are well planned but not spectacular and the instructions are a bit untidy.

Although neither spectacular nor holding any surprises the package is good value for money.

John Daddy

Colourful sequence for infants

Program: The Circus
Price: £13.80 (disc)
Supplier: Sherston Software, 8 Court Street, Sherston, Malmesbury, Wiltshire SN16 0LL. Tel: 0666 840433

TEACHERS who say that software designed for infants should be colourful, have few written instructions, and above all be fun, need look no further than **The Circus**.

The main menu allows the teacher to alter certain levels, or to set up a sequence of children and games, a very useful facility.

Apart from the teacher's screens, there are five main choices which together provide valuable experience with counting, matching colours, numbers and shapes.

Make A Circus allows children to build up an illustration of a circus by selecting pictures from the borders.

These can be positioned and coloured and the scenes can be animated so that the jugglers, clowns, and acrobats will perform.

Clown Snap can even be played by pre-school children, who will find matching the various shapes of parts of the clown's face great fun.

The Strong Man is trying to lift his weights, and it is important that the masses on each end of the bar balance correctly by adding or subtracting weights until this is achieved.

Circus Count is poor in comparison with the rest, although it does show the relation between a group of objects and the corresponding numeral.

My favourite is the marvellous Custard, in which colours, numbers or words have to be swiftly matched so that each child tries to build up and throw a plate of custard over his opponent.

This is a delightful package, well programmed and totally crash-proof, and will certainly enliven classroom activity.

Phil Tayler

Learning with the dragon king

Program: Wizard's Revenge
Price: £14.38 (disc)
Supplier: Sherston Software (see above)

IN many primary schools adventure programs have been shown to offer teachers and children exciting possibilities to work both with the computer and away from it.

The story for **Wizard's Revenge** begins when you go to visit your auntie near the seaside on holiday. While she is snoring in her deckchair you choose where to wander, gaining various clues and eventually meeting a little dragon.

The dragon asks for your help, and you move on to the second part of the adventure which is set on an island. Here four keywords have to be gained by passing certain tests before entry to the wizard's castle.

Throughout the program problems have to be solved before progress to another part can be made.

For example, the story begins with chores before the children can go to the beach, so washing up involves number work.

The train journey brings in timetables, and also money to buy the tickets.

Once on the island, drawn rather attractively with an overlaid coordinate grid, the child can choose which square to explore.

Some squares contain tests which are both fun and educational and these must be passed before passwords are given.

When all four passwords and the key to the dungeon are successfully gained there is a journey by bus across the desert before the castle is reached and the dragon king released.

The program may eventually become repetitive because the clues and passwords are always the same, but it will provide a lot of enjoyable learning for junior children.

Phil Tayler

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MINI OFFICE 2

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"Super Art is a super start! Using the program is great fun and can be learned within minutes." (A&B Computing 01/86) "A complete, professional package that stands amongst the best on any computer ... remarkable value." (Sinclair User 02/86) 6502, Wordwise/View compatible. Includes new 16K ROM and Mouse, plus SUPER ART and ICON DESIGNER on disk. (State 40 or 80 Track.) (AMX) **Save £10.00 on recommended price of this ROM/Mouse/Disk kit. Pay only £79.95.**

REPLAY ROM

"A magical piece of equipment ... very useful if you can only buy the tape version of a program ... highly recommended." (A&B Computing 12/85) Transfer any program, just about, from tape to disk. State type number when ordering: TYPE R8271 for Acorn DFS, Acorn DNFS, Amcom S/D, Watford S/D, Pace. TYPE R1770 for Opus DDOS 3.45, Solidisk DDOS. TYPE R2791 for Opus 3.15. TYPE R2793 for Opus 3.25. TYPE R1770C for Opus Challenger. TYPE R8272 for U.D.M. TYPE R8877 for Cumana QFS. (Vine) **REPLAY ROM £35.00**

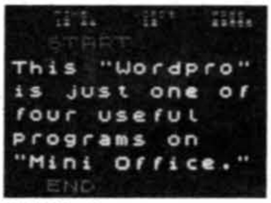
STUDIO 8

This program contains over 20K of machine-code to convert your Beeb into a 4-voice synthesizer with an 8-track digital recorder with rhythm and drum machine. Comes with 4 music demos. Select any of 32 instruments by name and compose music. (Beebugsoft) **Cassette £17.00 Disk (40/80 Track OK) £22.00**

FLOPPYWISE +

"The piece de resistance is CLONE. I have been using this for several weeks and have yet to find a disk that it has not copied ... to copy for any purpose other than personal backup is illegal." (Micro User) This ROM contains CLONE plus 39 other useful routines from Autosaveing to Copyproofing. (Software Services) **FLOPPYISE+ ROM £29.95 ROM**

Southern Belle

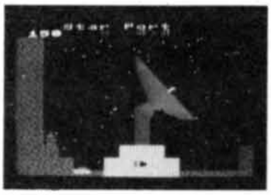


```
START
This "Wordpro"
is just one of
four useful
programs on
"Mini Office."
END
```

Mini Office 2

ASCII CHART

Floppywise



Citadel

AMX Mouse

SOUTHERN BELLE

"Steam train fanatics and simulation freaks will love it. The atmosphere is terrific (smell that smoke) and the options mean its got lots of lasting interest." (Amstrad Action 11/85) "Once mastered, it's brilliant. The job becomes very exciting and involved when attempting speed runs ... there's a great deal of skill involved and hardly any luck, a must for simulation lovers." (Crash 11/85) (Hewson) **Cassette £7.95**

POWERPLAY

"A game brimming over with originality ... taken elements of strategy from old favourites such as Draughts and Chess and fused them with Trivial Pursuit, spicing up the mixture with a touch of Greek mythology... Powerplay's most outstanding features are its high-quality graphics and sound ... comes with over 2000 questions, which should keep the most avid player hooked for some time ... AN OUTSTANDING PIECE OF BBC SOFTWARE." (Personal Computer World 02/86) Powerplay, the Game of the Gods, is by Arcana. 4 skill levels. Acorn Speech Chip makes it talk to you. Input your own questions if you wish. **Disk (40/80 Track OK) £14.95**

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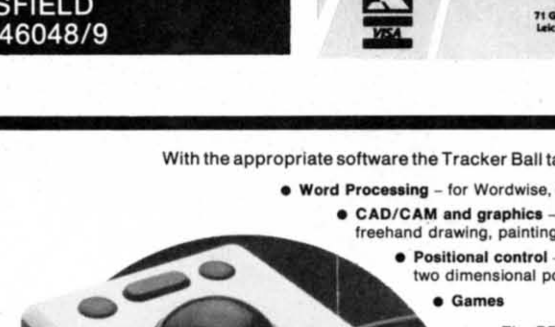

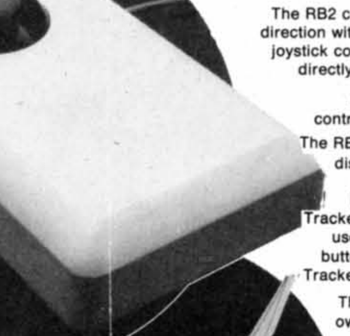

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Inside the Master's faster, more powerful Basic

By PETER JOHNSON

THERE are many interesting facets of the Master 128. In this article we'll look at just one of them – the improved version of Basic supplied with the machine, Basic IV (or CBasic as it has been called due to the use of the CMOS 6502 instruction set).

To keep the discussion manageable I'll assume you know normal BBC Basic pretty well, and are interested in the esoteric new features of Basic IV.

Although identical in use to the previous BBC Basic standard, which was Basic II, the new Basic provides some new commands and statements which make it more powerful and faster than ever.

It may seem strange that Basic could have been enhanced to any degree and kept to the same size of 16k. The reason is simple – the Master machines use a new version of the 6502 processor, the 65SC12, which has a few new instructions which do the same thing as several instructions on the standard 6502, thus saving valuable memory.

A version of this processor is used in the 6502 second processors. The new instructions for this were described in the September and October 1985 issues of *The Micro User*, and details are also included in Table I (see Page 88).

By using these new instructions Roger Wilson, the author of BBC Basic and designer of the ARM instruction set, has managed to reduce the space and time required by existing Basic functions, and squeezed the new bits in the space created.

I'll talk first about the new commands – that is, the things you can type only after the > prompt – then describe the new programming features.

One of the incredible things about Basic IV is that if you type:

```
*BASIC
REPORT
```

it says (C) 1984, which means it's been around for well over a year. Just how long have Acorn had the Master Series under wraps?

The only totally new command is EDIT. This is used to call a screen editor which can be used to edit Basic programs instead of using cursor copying.

When EDIT is entered, Basic first has to convert the program, which is held in a special tokenised form, into pure text. It does this by LISTing the program, but instead of sending the characters to the screen it stores them in memory. There they can be accessed by the editor.

There is a bit of a restriction on the size of programs which you can edit, but with good reason. When the program is being LISTed into memory both the tokenised version and pure text version of the program must exist at once. This is so that if the text version is too big to edit, the "No room" error can be given and the program may remain intact.

So, say programs are 30 per cent bigger when converted to text than the tokenised version, and the amount of memory available is 29184 bytes (PAGE at &E00 and HIMEM at &8000, as is usual on a Master 128), then the biggest program that can be EDITed is about 12690 bytes long.

Once the program text has been listed into memory the editor is called. Basic just issues a *EDIT command. Well, I say "just". In fact, it does a special form of *EDIT, where additional parameters tell the editor (which is another program in the Master 128 MegaROM) where in memory to find the text to edit. The form of this *EDIT command is:

```
*EDIT [start pointer address],[end po
inter address]
```

The [start pointer address] is the address in hex and in zero page of a pointer to the start of the text. The [end pointer address] is the address of a pointer to the byte after the end of the text.

For example, after converting the program to text, Basic stores the address of the first byte of text in locations &12-&13, and the address of the end – just after the program – in addresses &02-&03. The call to edit is thus:

```
*EDIT 12,2
```

When EDIT starts up it looks at the rest of the command line. If there is nothing there, it just does a "new". If there's a filename, it loads it, and if there's a couple of numbers, as above, it uses the contents of the pointers to initialise its own text pointers.

Here's an illustration of how to call EDIT in this way. Type the following lines in Basic's command mode:

```
DIM string 20
$string="HELLO THERE"
!&70=string
!&72=string+LEN$string+1
*EDIT 70,72
```

When you call EDIT, the string HELLO THERE will appear automatically on the screen.

After you have edited the program, you will want to return to Basic with the program intact. The Shift+f4 command in EDIT asks you for the language you wish to return to. When you type BASIC, this is used as a command passed to the operating system. Once again, a special bit is tagged on to the end to tell Basic to start using a text program which resides in memory. The form of the command is:

```
*BASIC @
```

When Basic IV is called it checks for a @ within the first 32 characters after the *BASIC command. If one is found – and is followed immediately by a Return – an "in core" program is assumed.

The address of this text program is held in locations &00-&01, where Basic stores LOMEM. These are set up by the editor before issuing the star command. The textual program is tokenised as if it had been typed in at the keyboard.

The end of the text should be marked by a zero byte. Alternatively, Basic will stop reading from the in-core program if it runs out of room to insert lines.

Here's an example of how the in-core program facility works. This time Basic is used to generate the program instead of the editor. In command mode type the following:

```
NEW
DIM prog 100
$prog="10 PRINT ""It works!"""
prog?(LEN$prog+1)=0
!0=prog
*BASIC @
RUN
```

Pay attention to the number of quotes in the third line. Using this technique any editor can be used to create Basic programs, so long as it sets up &00-&01, puts a zero byte at the end and uses *BASIC @ to call Basic.

That just about covers the EDIT command, except to say that you can use EDIT IF ... just as LIST IF ... is now possible (see later). This isn't particularly useful though.

There are two enhancements to program listing. First, the formatting produced by the non-zero LISTO options is a lot better. This means that FOR ... NEXT and REPEAT ... UNTIL constructs line up properly when you list under LISTO 7.

The only time indentation goes wrong is when the NEXT A,B,C form of the NEXT statement is used. This closes three FOR loops, but LIST thinks only one has been changed, as illustrated by the following program listed under LISTO 7:

```
1000 FOR A=1 TO 2
1010   FOR B=1 TO 3
1020     FOR C=1 TO 4
1030       REM Some statements
1040     NEXT C,B,A
1050     REM You can't win them all
1060     END
```

If line 1040 were NEXT:NEXT:NEXT, LIST would get the indentation right. 6502 programmers among you may be wondering why Basic couldn't just count the number of commas after the NEXT and close that plus one lot of indentation.

For example, in line 1040 there are two commas, so close three FOR loops. Well, unfortunately in this case Basic lets you use array elements as looping variables. If you were particularly sick in the head, you could have the following program:

```
1000 DIM A(10,10)
1010 FOR A(0,0)=1 TO 100
1020   FOR A(0,1)=1 TO 20
1030     REM Some statements
1040   NEXT A(0,1),A(0,0)
1050   END
```

Obviously in this example counting the commas would be totally wrong, as one belongs to the NEXT and the others are subscript separators. The answer if you want well-formatted programs is not to use the NEXT A,B.. version of NEXT.

The behaviour of the tokeniser has changed a little from earlier versions of Basic. In particular, when the LISTO option is anything but zero, spaces after the line number are stripped.

This is to prevent a problem with the accumulation of spaces after the line number when lines were cursor-copied in Basics I, II and III with non-zero LISTOs. So if you've typed LISTO 7 (all indentation) and enter the line:

```
1000 PRINT "HELLO"
```

it will actually be entered into the program as:

```
1000PRINT "HELLO"
```

but since LIST is indenting for you, it shouldn't matter. One nasty effect of this is that you can no longer enter blank lines unless the LISTO option is zero. For example, to space out PROC and FN definitions I use lines such as:

```
2340[space]
```

in my programs. However if LISTO is non-zero on Basic IV, the space will be deleted, so the effect is the same as typing just the line number and will simply delete any line of the same number in the program.

The answer is to do a LISTO 0 before typing spacer lines or use something like:

```
2340:
```

The other major addition to LIST is the ability to LIST only those lines which contain a given string. After the usual (optional) line number range, you may now have the keyword IF, followed by a string to match. Only lines where the match succeeds will be listed. For example:

```
LIST IF DEF
```

will list all the lines with DEF statements, and:

```
LIST 10,200 IF "
```

will list all lines containing a quote character between lines 10 and 200 inclusive.

There are two things to look out for with LIST IF. First, if the search string contains one of the pseudo-variables TIME, PAGE, LOMEM, HIMEM or PTR, only the lines where it is included as a function will be listed. For example, with the program:

```
100 TIME=0
110 PRINT TIME
```

If you LIST IF TIME, only line 110 will be listed. This is because the pseudo-variables have two tokens, one

→

From Page 87

for use in statements (line 100) and the other when they are used as functions (line 110).

When a pseudo-variable appears in a LIST IF line it gets tokenised into the function form, and only that one is matched.

The other feature is that if you have the line:

```
10 GOTO 1000
```

it will be listed by LIST IF d. This is because Basic tokenises line numbers such as the 1000 after the GOTO above in a special four byte form.

The first of these bytes is &8D and the next three are a strange binary representation of the line number. In the case of 1000 one of the bytes happens to be &64, ASC"d", so the LIST IF prints line 10. This shouldn't be too much of a problem in practice, especially if you don't use line numbers very often.

A final change to LIST is that it now no longer detokenises characters in the range &80-&FF in REM statements, so you can embed Mode 7 colour codes in REMs without having to put a " immediately after the REM (which you used to have to do).

That just about covers the changes to command mode operation, except to note that AUTO no longer prints a space after the line number, presumably because Mr Wilson decided it was misleading since the space printed by earlier Basic wasn't actually part of the line. The additions to the rest of Basic are even more interesting. Some are very trivial, such as in VDU. Others such as ON ... PROC are fairly major.

Since I've mentioned it, I'll describe the ¦ in VDU. You will be familiar with the , and ; separators in VDU. A number followed by , is sent as one byte to the VDU drivers, one followed by ; is sent as two bytes. after a number is a synonum for ,0,0,0,0,0,0,0,0,0. That is:

```
VDU 23,1¦
```

is equivalent to:

```
VDU 23,1,0,0,0,0,0,0,0,0,0
```

Thus ¦ sends the number as a single byte followed by nine zero bytes to the VDU drivers. It may be used wherever , and ; may be used. Another example is:

```
VDU 19,1¦
```

Basic IV takes advantage of the extra instructions in the CMOS processor of the Master machines to provide shorter and faster routines.

You can use these too, as the assembler built-in to Basic has been extended to give a complete set of mnemonics. These, with their meanings, are listed in Table I.

The other change to the assembler is that the formatting of assembly listings – those produced by OPT 1-type assemblies – has been made neater.

There is now room for a label field at the start of the line, so that lines with labels on don't have their mnemonics pushed over to the right, unless the label is more than eight characters long.

Actually, this isn't new to Basic IV. Basic III – or American Basic, as it was designed for the American version – also included it.

Another feature the Basic IV shares with American Basic is the keyword COLOR as an alternative to COLOUR, though it's always listed as COLOUR.

A very nice feature which will be appreciated by programmers who, use lower-case in assembler, is that the assembler is now totally case-insensitive.

Earlier Basics let you have mnemonics in either case, such as LDA, Lda, lda, but expected the letters which form parts of addressing modes to be in upper case.

So you could say lda &70,X and equS "Hello", but not lda &70,x and equs "Hello". Now you can.

There was a problem with the earlier assemblers in that if you had a label beginning with A, say ATOMS, then something like ROR ATOMS would be taken not as a rotate right of location ATOMS, but as a ROR A followed immediately by the comment TOMS. This has been fixed in Basic IV.

BIT zp,x	Do a BIT operation with location zp+x.
BIT abs,x	Do a BIT operation with location abs+x.
BIT# imm	Do a BIT operation with imm (but doesn't affect the V flag).
BRA loop	Branch unconditionally to the label.
DEC A	Decrement the accumulator.
INC a	Increment the accumulator.
JMP (abs,x)	Jump to the address held in locations abs+x and abs+x+1.
PHX	Push the X register on to the stack.
PHY	Push the Y register on to the stack.
PLX	Pull the X register from the stack.
PLY	Pull the Y register from the stack.
STZ zp	Set [zp] to zero.
STZ zp,x	Set [zp+x] to zero.
STZ abs	Set [abs] to zero.
STZ abs,x	Set [abs+x] to zero.
TRB zp	AND [zp] with NOT acc., storing the result in zp. Set the flags on the result of [zp] AND acc.
TRB abs	AND [abs] with the acc., storing the result in abs. Set the flags from the result of [abs] AND acc.
TSB zp	OR [zp] with the acc., storing the result in zp. Set the flags on the result of [zp] AND acc.
TSB abs	OR [abs] with the acc., storing the result in abs. Set the flags with the result of [abs] AND acc.
ORA (zp)	Logical OR acc. with [[zp]].
AND (zp)	Logical AND the acc. with [[zp]].
EOR (zp)	Logical EOR the acc. with [[zp]].
ADC (zp)	Add [[zp]] to the acc.
STA (zp)	Store the acc. in [[zp]].
LDA (zp)	Load the acc. from [[zp]].
CMP (zp)	Compare the acc. with [[zp]].
SBC (zp)	Subtract [[zp]] from the acc.

Notes:

zp is a zero page address.

abs is an absolute address.

[zp] means the contents of zp.

[[zp]] means the contents of the location pointed to by [zp],[zp+1].

[abs] means the contents of abs.

DEA is a synonym for DEC A, INA for INC A and CLR for STZ.

Table I: The new instructions

which is equivalent to:

```
VDU 19,1,0,0,0,0,0,0,0,0,0
```

Don't worry that only four zeros are actually required by the VDU 19 command. The rest are swallowed up as Ascii 0 (NUL) has no action on its own.

Finally, and incidentally, did you know that space can be used instead of a comma in the VDU statement even in old Basics?

I also mentioned ON . . . PROC. This is an enhancement of the ON . . . GOSUB. Whereas the line:

```
1000 ON n GOSUB 2000,3000,4000,5000
```

jumps to the nth entry of the list of line numbers (where n evaluates to an integer between 1 and 4), this line:

```
1000 ON n PROCfred,PROCjim,PROCsheila
,PROClynne
```

calls the nth procedure in the list. The procedure may have parameters as usual, and the ELSE part may be included. For example:

```
1230 ON choice%+1 PROCalpha(10),PROCb
eta(a,b),PROCgamma(a+1,b-3) ELSE STOP
```

This is much more useful than ON . . . GOSUB, and means that the GOSUB keyword should never have to appear in BBC Basic ever again.

There are a couple of changes in the pseudo-variables. First the EXT# function, which returns the length of an open file, can now appear on the left hand side of an assignment. This gives us a way of shortening the length of a file. You could always lengthen a file by saying, for example:

```
PTR#chan=EXT#chan+1024
```

but it was never possible to shorten it. Now you can say:

```
EXT#chan=EXT#chan-1024
```

This will only work on filing systems which support the OSARGS operation which EXT#chan= actually invokes, that is OSARGS with A=3. The ADFS and ANFS support the call, the CFS and 1770 DFS do not.

The other pseudo-variable change is TIME$. This is used to read and write the time from the battery-backed real-time clock. When used as a function, TIME$ returns a string of the form:

```
Tue,21 Jan 1986.14:59:00
```

The string is always 24 characters long, with date and time being separated by a full stop. When as a statement, TIME$= is followed by a string expression which evaluates to either a time, date or both.

The time is in the format given after the . above, such as TIME$= "12:00:00". The date follows the format before the . as in TIME$="Wed,01 Jan 1986". Or you can set both at once by giving a string in exactly the same format as above.

● *Well that's plenty for now. Next time we'll take a look at the new star commands and PLOT codes.*

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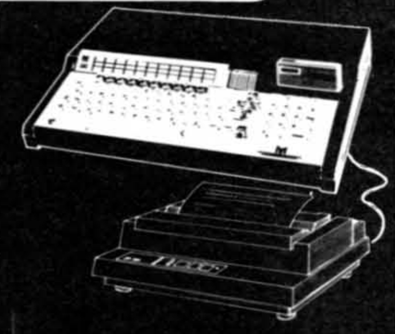

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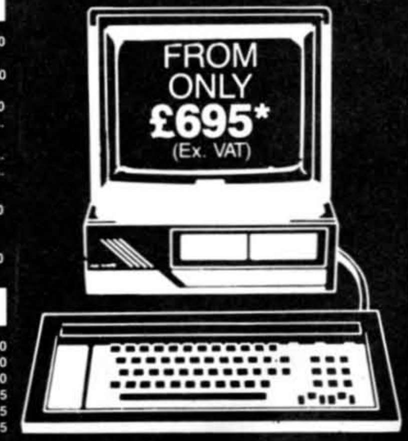

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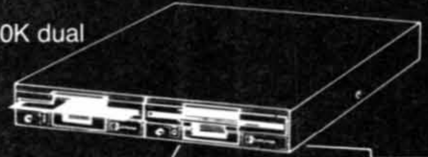

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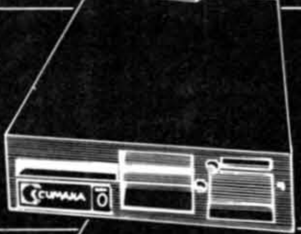

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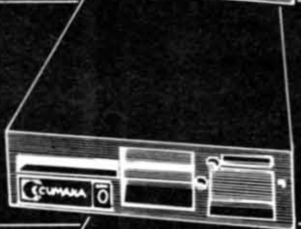

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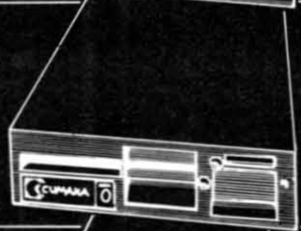

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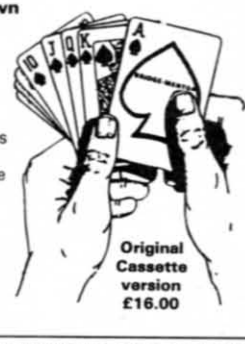

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Hexer will help you cast light on machine code

MIKE BIBBY helps make sense of machine code

LAST month we ran our first machine code program. Probably as good a place as any to start this month would be to consolidate some of our ideas.

Idea one: A machine code program is a sequence of bytes stored in a memory location. A byte is a number between zero and 255 which, conveniently enough, is just the range of numbers that can be stored in a memory location.

Idea two: To run a machine code program we point the 6502 at the start of it and say go! The 6502 gets the first byte from memory, decodes its meaning – hence the words machine code – and does what that byte tells it.

Let's look at this in practice: Our first program was:

A9 41 8D 00 7D 60

Doesn't make sense does it? You see, we humans are more into words than numbers, so let's try a verbose version:

```
LDA #&41         A9 41
STA &7D00        8D 00 7D
RTS              60
```

We've listed the instructions together with the bytes that go with them. Notice that a single instruction may involve one, two, or three bytes. How does the 6502 know which has how many?

Well, it works that out when it decodes the instructions. You see, each valid hexadecimal instruction or opcode not only gives the 6502 a job to do, it tells it where to get its raw materials from.

Often the opcode needs some more hexadecimal numbers following it to give it data to work on – or to tell it where to get data from and so on.

In the first case we have an opcode &A9 and following it data &41. The 6502 worked it out like this:

"&A9. Ah, that wants me to load my internal memory byte, called the accumulator, with a number. That's why its mnemonic is LDA – LoaD the Accumulator. I know that opcode &A9 means that the number I load the accumulator with is the hex number that's next after &A9 in memory.

"Let me see, that's &41. Right so I load the accumulator with &41 and that's one instruction over with. So I've dealt with bytes &A9 and &41, finished with one instruction and am ready for the next. Well that must be the next unused byte, &8D."

So what does &8D boil down to? This means STore the Accumulator (STA) in a memory location. What memory location? Well &8D tells the 6502 that the address of the location is given, lo byte, hi byte fashion in the two bytes following it. (See the panel on lo byte, hi byte if you don't follow.) Here the two bytes are &00, &7D, so the address to copy the accumulator into is &7D00.

Right, so the 6502 dealt with these three bytes and is ready for another instruction. That must be the byte in the next "unused" memory location, so it's a &60. This just ReTurnS (RTS) us from whence we came. This is a vital "stopper" for our machine code routines.

Actually we've been a bit naughty, we haven't said where our program actually is, and that's vital. You've got to put a machine code program into context, that is, tell it which area of memory you want to store it in. Last month we stored it at &900, so here's our full mnemonic listing.

```
Location   Mnemonic    Opcodes
 0900      LDA #&41    A9 41
 0902      STA &7D00   8D 00 7D
 0905      RTS
```

Program I

Remember, the mnemonics are there for your convenience – the way the program actually exists in memory is more accurately represented in Figure I.

Idea Three: To keep track of where it's up to in memory, the 6502 uses a two byte internal register called the Program Counter. This points to the next instruction to be done.

We can now fill out our exploration of how the 6502 knows where to get the next opcode or instruction from. The Program Counter (PC) holds the address of the next instruction to be done.

When it starts on the initial opcode of this instruction, the 6502 decodes how many bytes are needed for the complete instruction (one, two or three) and adds that to the PC so that the PC yet again points to the memory address of the next instruction to be done.

Last month we used CALL &900 to point our 6502 at the first instruction to be done. We can see now a little more

→

Memory location	&900	&901	&902	&903	&904	&905
Contents	A9	41	8D	00	7D	60

Figure I: How Program I is stored in memory

From Page 95

clearly how it works. The CALL &900 causes the Program Counter to be loaded with &0900, so the 6502 picks up its next opcode from there – that is, it starts doing our program.

All right, so what does Program I do? The effect is to put an A on the screen (assuming you're in Mode 7). You see the Mode 7 screen is what's known as a memory mapped screen – the character shown at any position on the screen is determined by the value stored in a particular byte of memory.

On the Mode 7 screen – provided you haven't done any scrolling since the last clear screen – the memory used to determine what goes on the screen starts from &7C00. If we haven't scrolled &7C00 corresponds to the top left character position of our screen, so if we store a number in that particular memory location the character with the corresponding Ascii number appears there.

What actually happens is that at every flicker of the TV screen a clever chip looks at the memory from &7C00 onward and "generates" the corresponding characters in their correct positions on the screen.

Other modes work similarly, but use more memory to generate the screen, giving you room for more detail, such as finer graphics and colours. At first though, most of our work will be done on the unscrolled Mode 7 screen. (Clear the screen before CALLing your code to be sure of this.)

Program I puts the character at &7D00. Since the screen starts at &7C00, with character number 0:

&7D00-&7C00=&100

means that our letter A will appear as character number &100, that is, 256. As there are 40 characters "cells" to a row, and:

256=6*40+16

&7D00 corresponds to character number 16 on row number 7. Think!

Let's change this so that the A appears as the first character on the third row down – row 2. The first row goes from character cell 0 to 39, so the second goes from 40 to 79, which means the first character on the third row down is character cell 80 (&50). So the character cell we're after is mapped onto memory location:

&7C00 + &50 = &7C50

Remembering that the 6502 likes its addresses specified as two byte numbers with the low byte first, our modification of Program I gives us Program II.

```
Location   Mnemonic    Opcodes
 0900      LDA #&41    A9 41
 0902      STA &7C00   8D 00 7C
 0905      RTS         60
```

Program II

By now you should know that a machine code program consists of a sequence of bytes in memory. So how do we get them into memory? One way is to use a special translator called an assembler that will take our mnemonics and convert them into the appropriate hex codes at the correct place.

The BBC Micro has such an assembler built in and we'll be making a great deal of use of it later on.

For the moment though we'll get a better feel for machine code if we use a simple hex loader. This is a program that pokes the hexadecimal numbers you give it into the memory locations you want.

Hexer, listed alongside this article, not only does this for you, but also displays the contents of memory locations, so you can check the

LO BYTE, HI BYTE

IN the last couple of months we've seen that we often have to deal with hexadecimal numbers bigger than can be held in one byte. We found that we could cope with numbers in the range 0 to 65535 by using two bytes "side by side".

Just as one byte required two hex digits to specify it (&06=6, &FE=254) so our larger two byte numbers required four hex digits (&0006=6, &FFFE=65534).

It often helps to think of these two byte numbers as being two column numbers, the value in each column corresponding to each of the bytes, that is, each pair of hex digits.

For instance, &2345 could be thought of as two columns, the high column, or byte, containing &23 and the low column or byte containing &45. Similarly, for &FE07 the high byte column would be &FE and the low byte column &07.

If you cast your mind back to last month you'll remember that to convert a two byte hex number to decimal you multiply the high byte by 256 and add the decimal equivalent of the low byte to it. For instance:

&2345 = 35*256 + 69 = 9029
&FE07 = 254*256 + 7 = 65031

If you want you can think of the hi (high) byte as the 256s column, and the lo (low) byte as the units column.

One of the things we frequently use two byte hex numbers for is to specify an address. For example, &7D00 can, and does, refer to a memory location. To store the value of the accumulator there we'd use the instruction STA &7D00.

However that's in our convenient mnemonic terms. The 6502 likes things in hex, stored in a string of contiguous memory locations.

In this case the hex for STA is &A9, so you might think that in memory the code would be:

A9 7D 00

It isn't, though. The 6502 likes addresses with the lo byte coming *before* the hi byte. We say that it likes addresses in lo byte, hi byte fashion. this means STA &7D00 translates as:

A9 00 7D

Don't be too hard on the 6502 for this quirk, it's quite understandable. After all, when you're doing your hundreds, tens and units sums, you start with the low column, the units, first. Similarly the 6502 finds it easier to start with the lo byte first – and expects you to deliver.

Incidentally, it's a convention that we write hex numbers with an even pair of digits, even if we have to add a leading zero, so that &9 is written &09 and &3EF is written &03EF.

OFF TO A FLYING START

HEXER is a utility designed to get you off to a flying start in machine code. You can:

***Display Memory:** This option prompts you for a start address, then displays the contents of memory eight bytes at a time, preceded by the address of the first byte of that line to help you keep track.*

Pressing Return shows you the next eight bytes and so on. To return to the main menu enter X for exit.

***Alter Memory:** Again you're prompted for a start address, then you're shown the contents of that location and are given the option of changing it.*

You can either enter a hex number – which will replace the current contents – or simply press Return and leave the byte unchanged.

Again, X exits. This, of course, is the option you use to enter your machine code programs.

***Run Code:** This CALLs the machine code routine at the address you enter, clearing the screen first.*

***Exit Hexer:** This returns you to Basic command level. Be warned, Hexer is not idiot-proofed. For example, it doesn't check to see if the numbers you're entering really are valid hex.*

Also it sets HIMEM to &1FFF to give you &2000 and above for your code, up to &7C00 – Hexer works in Mode 7. When prompted for a start address, pressing Return defaults to &2000.

One final point: Hexer directly alters memory, and any typing errors you make can be catastrophic – so save it before you try to run and debug it.

```
 10 MODE 7
 20 HIMEM=&1FFF
 30 end% = FALSE
 40 VDU 23;8202;0;0;0;
 50 @%=4
 60 *FX 202,32
 70 REPEAT
 80 PRINT '"You may :-"'
 90 PRINT"  1. Display memory"
100 PRINT"  2. Alter memory"
110 PRINT"  3. Run code"
120 PRINT"  4. Exit hexer"
130 PRINT'"Enter option"'
140 REPEAT
150 choice$=GET$
160 UNTIL INSTR( "1234",choice$ )
170 choice%=VAL(choice$)
180 IF choice% = 1 THEN PROCmemory
190 IF choice% = 2 THEN PROCalter
200 IF choice% = 3 THEN PROCrun
210 IF choice% = 4 THEN end%=TRUE
220 UNTIL end%=TRUE
```

```
  230 END
  240 DEF PROCmemory
  250 INPUT "Start Address? " address
$
  260 IF address$="" THEN address$="2
000"
  270 address% = EVAL("&" + address$
)
  280 REPEAT
  290 PRINT ~ address%;
  300 FOR loop%= 0 TO 7: PRINT ~?(add
ress%+loop%);: NEXT loop%
  310 address% = (address% + loop%) M
OD &10000
  320 PRINT
  330 UNTIL INSTR("Xx",GET$)
  340 ENDPROC
  350 DEF PROCalter
  360 LOCAL end%
  370 end%=FALSE
  380 INPUT "Start Address? " address
$
```

```
  390 IF address$="" THEN address$="2
000"
  400 address% = EVAL("&" + address$
)
  410 REPEAT
  420 PRINT ~ address%;
  430 PRINT ~?(address%)" ";
  440 INPUT "? " byte$
  450 IF INSTR( "Xx",byte$) AND byte$
<>"" THEN end% = TRUE
  460 IF byte$<>"" AND NOT end% THEN
?address%=EVAL("&"+byte$)
  470 address% = address% + 1
  480 UNTIL end%
  490 ENDPROC
  500 DEF PROCrun
  510 INPUT "Start Address? " address
$
  520 IF address$="" THEN address$="2
000"
  530 CLS
  540 CALL EVAL ("&" + address$)
  550 ENDPROC
```

accuracy of the programs you've entered and their effect on memory.

We'll be using Hexer a fair bit over the next few months, so I suggest you type it in and save it. Once you've got it debugged use it to enter Program II, then use option three to CALL the routine.

Then try altering Program II. Get it to "print out" different letters, or an asterisk (Ascii &2A). Change the location on the screen it appears at – making sure it isn't over written when hexer's options menu re-presents itself on the screen.

Then try writing out more than one letter at once. Why not, using Hexer, try locating your code at &2000? Table I gives you some useful start addresses for rows of the unscrolled Mode 7 screen.

Once you can play around and adapt Program II with impunity you'll have gained a fair understanding of what machine code is. With that – and Hexer itself well and truly typed in – you'll be ready for the feast of programs and new ideas coming next month.

line number	address of first character
0	&7C00
1	&7C28
2	&7C50
3	&7C78
4	&7CA0
5	&7CC8
6	&7CF0
7	&7D18

NB Assumes no scrolling has occurred
eg screen just cleared

***Table I:** Some unscrolled Mode 7 line start addresses.*

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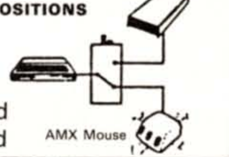

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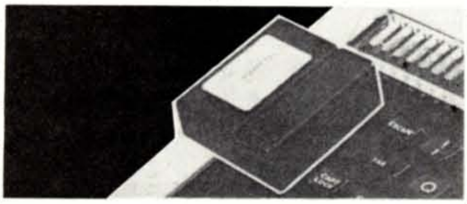

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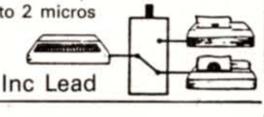

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Piling on the pressure .. according to Boyle

MIKE COOK moves away from music in Part 36 of his course to look at pressure sensing applications

THIS month I want to look at a neglected area of computer interfacing, that of sensing pressure. No, not the "get it by yesterday" type of pressure, but the type studied by Boyle and others. I shall explore the techniques of measuring pressure in a gas or liquid and some of the applications to which we can put this.

Rather than presenting a cut and dried project I intend to show how you can begin experimenting with pressure sensing.

The measurement of pressure is very useful. For example you can monitor atmospheric pressure for a weather station. You can investigate the pressure in and around an internal combustion engine or measure vibrations. With suitable hardware you can even weigh objects quite accurately, and there are applications in monitoring and control.

The only snag with all this is that pressure transducers tend to be expensive. Nevertheless, let's have a brief look at what's available and how they work.

While there are a few different types of pressure transducers, the family we are going to look at here is the type based on the monolithic piezoresistive crystal – one which changes its resistance in response to mechanical stress. In a pressure transducer the piezoresistive crystal is formed into a bridge circuit.

The Wheatstone bridge was invented by Charles Bridge for the measurement of relative resistances. Figure Ia shows a simple potential divider. The voltage at point V depends upon the supply voltage and the ratio of the two resistors. This voltage will increase and decrease with resistor B increasing and decreasing, whereas if resistor A changes the change in voltage will be reversed. That is, as A increases the voltage decreases.

Now suppose we have a physical phenomena that alters resistance. If we make two such potential dividers and make the top resistor variable in one and the bottom resistor the variable in the other, we have doubled the size of the effect.

By measuring the difference in the mid-point voltages we can get a more accurate measurement than would otherwise be possible. This is shown in Figure Ib. However, just to confuse us, the resistors are normally drawn in a diamond configuration as shown in Figure Ic.

By altering the resistors that are not effected by the physical phenomena we can get both voltages to be the same or as we say, balance the bridge. This can be done with great accuracy because you only need to detect whether there is a voltage, not measure how large it is. Then, with some simple calculations, the values of the unknown resistors can be worked out from the values needed to balance the bridge.

Pressure transducers, however, make all resistors in the bridge active. One set of resistors respond to pressure in one way and the second set respond in the opposite sense.

It is quite easy to understand how this happens if you look at Figure II which shows a crystal being deformed under pressure. The top surface is stretched

→

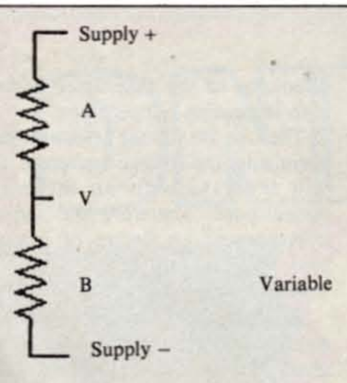


Figure Ia: A potential divider

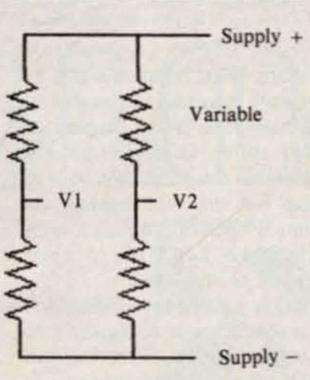


Figure Ib: A bridge

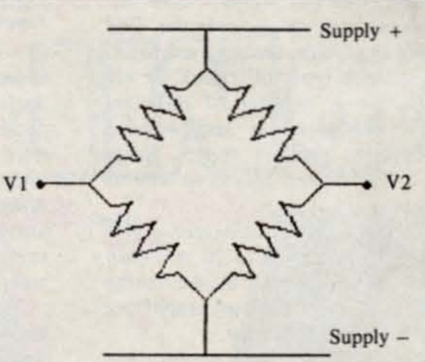


Figure Ic: A bridge drawn conventionally

From Page 99

and offers a longer path to the current, so the more pressure the crystal is under, the greater is the surface resistance.

Similarly, the bottom surface is compressed, presenting a lower resistance with increasing pressure. This is just the phenomena that we need to construct a bridge.

The pressure transducer is made by etching a diaphragm into a crystal and connecting it up like a bridge. As pressure can be applied to both sides of the diaphragm we can construct basically three different types of pressure transducer. These are illustrated in Figure III by reference to National Semiconductors LX06XXX series of pressure transducers. The three Xs on the end of the number indicate that any number may be used and still be in the same family.

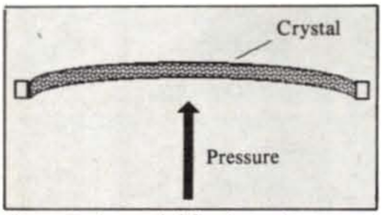

Crystal
Pressure

Figure II: A crystal deforming under pressure

The first type measures pressure differences by applying pressure to both sides of the diaphragm. One side increases the bridge output and the other side decreases it. Hence they are labelled positive and negative ports.

The second type measures absolute pressure by sealing one side of the diaphragm in a vacuum.

Finally the third type has one side of the diaphragm open to atmospheric pressure so that any pressure measured is relative to atmospheric pressure. This is known as a Gage pressure transducer.

These three types of transducer are available in a number of different physical configurations and working over different pressure ranges. Some types can withstand liquids as well as gases.

The transducers are calibrated to give anywhere between 1.4 to 20 mV each pound per square inch, so in all cases the transducers' output will need amplifying before it can be measured.

Unfortunately there is a further fly in the ointment. As well as being sensitive to pressure all transducers are sensitive to temperature. What happens is that as the temperature increases the sensitivity decreases, almost as if the diaphragm were getting stiffer. Of course it's not really, but that is the effect. We have to compensate for this by making the bridge supply voltage change with temperature to keep the output independent of temperature.

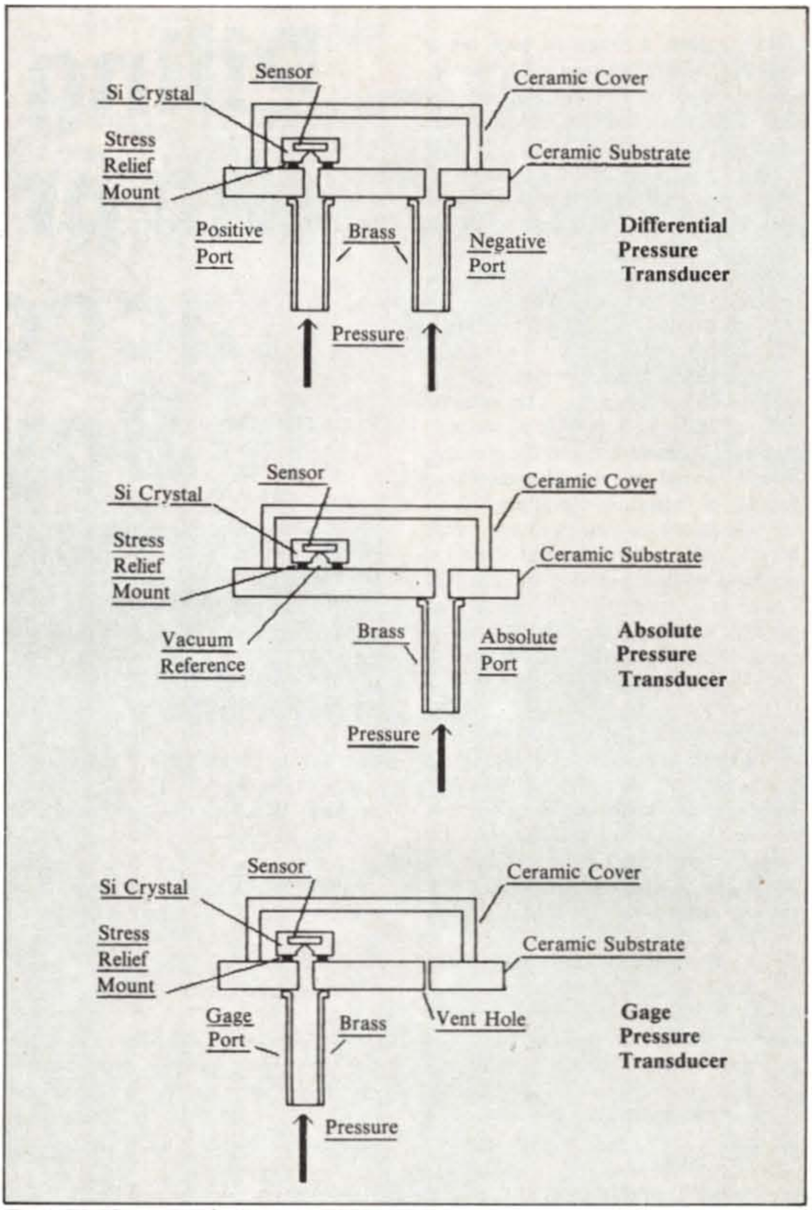

Sensor
Si Crystal
Ceramic Cover
Stress Relief Mount
Ceramic Substrate
Positive Port
Brass
Negative Port
Differential Pressure Transducer
Pressure
Sensor
Si Crystal
Ceramic Cover
Stress Relief Mount
Ceramic Substrate
Vacuum Reference
Brass
Absolute Port
Absolute Pressure Transducer
Pressure
Sensor
Si Crystal
Ceramic Cover
Stress Relief Mount
Ceramic Substrate
Gage Port
Brass
Vent Hole
Gage Pressure Transducer
Pressure

Figure III: Three types of pressure transducers

The solution used in the LX06XXX series of transducers is to mount two thermistors in the bridge. This is shown in Figure IV along with the physical pin out of the device. The idea is that the resistance of the thermistor decreases with increasing temperature.

Then, as the voltage across the device is constant the voltage across the bridge will increase with an increase of temperature. Therefore the sensor is compensated for decreased sensitivity and the overall sensor output is independent of temperature.

The trick is to get the thermistors to accurately track the transducer's change. To do this they are made using thick film technology which involves screen printing resistors on to a ceramic substrate using conductive inks.

Then areas of the printed regions are etched away using a laser until exactly the right value is found. This individual laser trimming of each component adds greatly to the accuracy – and to the cost.

As the thick film substrate is the same one as used to mount the pressure transducer, good thermal tracking is assured.

Armed with a temperature compensated transducer we can see what is needed to make a pressure gauge. Figure V shows a typical circuit which can be used to connect a transducer to the analogue input port on the BBC Micro. Using an LM324 you can get about 2 per cent accuracy over a temperature range of 5 to 40 °C.

The circuit consists of three operational amplifiers connected as a differential amplifier. It is basically the same as the one I used for the Heart Rate Monitor in the April 1984 Body Building article.

Each arm of the bridge is first buffered and amplified before being combined so that the difference is taken. The overall gain of the amplifier is the product of the two stages. With the components shown, the gain is simply the value of R2. As R2 is 20k, the gain will be 20.

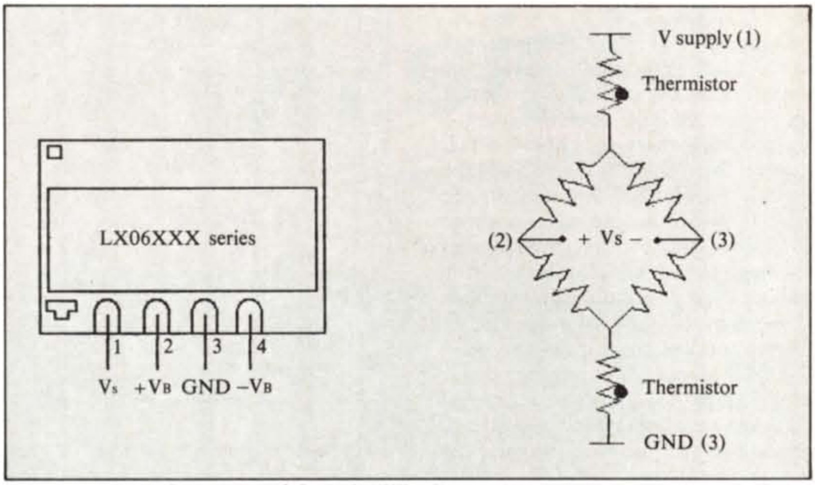

LX06XXX series
1
2
3
4
Vs
+VB
GND
–VB
V supply (1)
Thermistor
(2)
+ Vs –
(3)
Thermistor
GND (3)

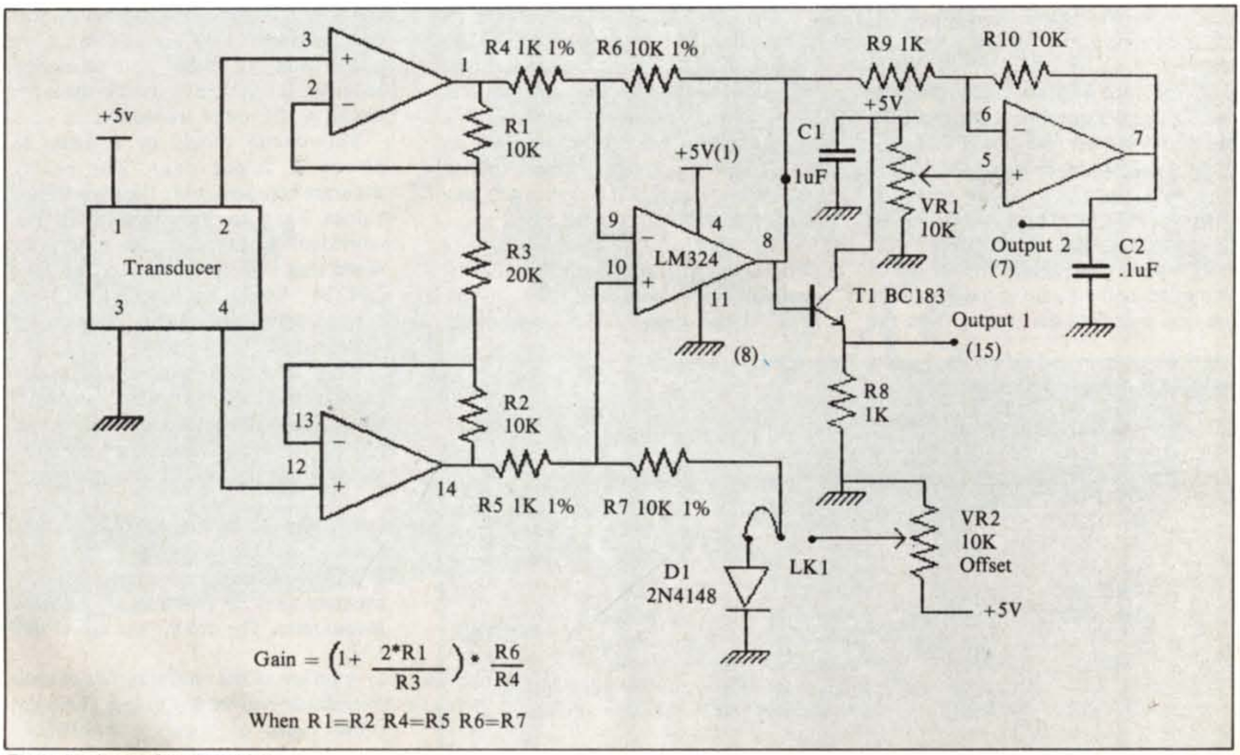
Figure IV: Electrical connection of the LX06XXX series

You can work out the gain you need by multiplying the transducer's sensitivity by the maximum pressure and dividing this by the maximum voltage of your detector. Try to keep R2 below 470k. If you want any more gain then you will have to alter the other resistor values.

As the operational amplifier can't get very close to its power rails, 0.7 of a volt is removed by passing the output through an emitter follower. In order to compensate for this voltage drop R7 is taken to earth through a diode.

If you have a differential or Gage transducer this point should be taken to a mid voltage point by using VR2. This is to bias the signal, as the output could

→


+5v
1
2
Transducer
3
4
3
2
+
–
1
R4 1K 1%
R6 10K 1%
R1
10K
R3
20K
R2
10K
13
12
–
+
14
R5 1K 1%
R7 10K 1%
+5V(1)
9
10
4
LM324
8
11
(8)
R9 1K
R10 10K
+5V
C1
1uF
VR1
10K
6
5
7
Output 2
(7)
C2
.1uF
T1 BC183
Output 1
(15)
R8
1K
D1
2N4148
LK1
VR2
10K
Offset
+5V

$$\text{Gain} = \left(1 + \frac{2^*R1}{R3}\right) \cdot \frac{R6}{R4}$$

When R1=R2 R4=R5 R6=R7

Figure V: A transducer amplifier

From Page 101

swing in either direction. However with an absolute type of transducer the signal can only go in one direction as you can't get a lower pressure than a vacuum.

This circuit uses an LM324 which contains four operational amplifiers, the fourth being used to further amplify the transducer output to give a more accurate reading over a restricted range of pressures. The variable resistor VR1 adds an offset voltage to allow the range of pressures to be set. To get a really fine control you can use a multi-turn pot.

As this output has undergone a lot of amplification it is inevitable that some noise will have been picked up – C2 will help to filter this out. Note that this is an inverting amplifier so that if the pressure increases the output voltage will drop. You can take care of this in your calibration procedure.

The circuit shows the connection to be made to the analogue input port. This has a rather unstable reference of about 1.8v and for this application is best being read with an ADVAL(1) AND 255 statement to restrict the values returned to 8 bits.

Normally the built-in converter is just about good for 10 bits and is ANDed with a value of 1023. However the last two bits are rather noisy and unless you take the average of about 10 measurements you are better sticking to 8 bits.

If you want a more stable reference and accurate measure of the pressure, you could use the four and a half digit DVM described in the April 1985 Body Building article. This allows measurement of voltages to be made to an accuracy of greater than 1mV.

By knowing the actual voltage out of the system and the gain of the amplifiers you can calculate the output from the transducer. From the sensitivity of the transducer you can then work out the pressure.

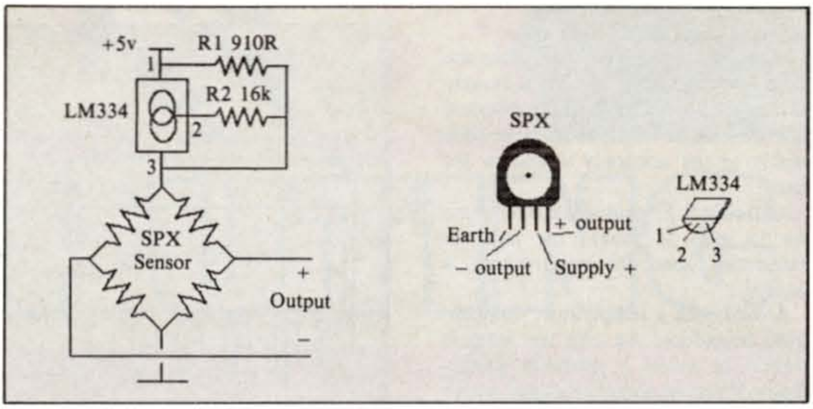


Figure VI: Compensation of the SPX transducer

Note that the DVM will only give about three readings per second and so this method is not suitable when you want to measure rapidly changing pressures.

There is an alternative way of temperature compensation and this allows us to use much cheaper transducers. These transducers are the SPX range. They have only a simple hole in one side for the absolute range, and both sides for differential or gauge measurements.

They have a fairly wide range of sensitivities and so would probably need to be calibrated in most situations. As they are un-compensated we have to make some form of temperature compensation. To do this we need an LM334 programmable current source. As its name implies this device acts as a constant source of current.

The size of the current can be programmed by the value of an external resistor. Now the current output of the LM334 rises linearly with temperature. In fact it rises at a greater rate than the sensor's sensitivity drops.

If we use the LM334 on its own we would over-compensate, so what we have to do is supply some of the bridge current from the LM334 and some from a shunt resistor. If we get the proportions of currents right we will have a current supply that changes to match the change in bridge sensitivity.

Going by the values on the data sheets for the sensitivity of the cheaper SPX transducer, we get a compensation circuit as shown in Figure VI.

The resistors should be of the metal film type as they are the most stable with changes in temperature and having just compensated for the bridge change, we don't want to bother with changing resistors. It can then be used in the same circuit as the other transducer.

This circuit should be accurate to about ± 2 per cent. For really accurate compensation, the two resistor values have to be adjusted on the individual transducers. It should be noted that both the transducer and the LM334 should be in close thermal contact so that they are both at the same temperature.

This month's project is more experimental and so does not lend itself to a printed circuit board. However as pressure transducers are not the easiest things to get hold of, I can supply them with the kits.

On offer this month is a kit of parts to build the circuit in Figure V consisting of a piece of veroboard, the op-ams and resistors, and a selection of pressure transducers. The order form is on Page 122.

A review of the vital statistics of each transducer is given in Table I. There are other types of pressure transducer available. Write to me with an SAE if

Type	**Range**	**Sensitivity**	**Type**
LX06015A	0 to 15 psi	6.67 mV/psi	Absolute
LX06030A	0 to 30 psi	2.63 mV/psi	Absolute
LX06001G	–1 to +1 psi	27.7 mV/psi	Gage
LX06005G	–5 to + 5 psi	10.0 mV/psi	Gage
LX06015G	–15 to +15 psi	6.65 mV/psi	Gage
LX06100G	0 to 100 psi	1.4 m/V/psi	Gage
LX06001D	–1 to +1 psi	27.7 mV/psi	Differential
LX06005D	–5 to +5 psi	10.0 mV/psi	Differential
LX06015D	–15 to +15 psi	6.67 mV/psi	Differential
LX06030D	–30 to +30 psi	2.63 mV/psi	Differential
SPX200A	0 to 30 psi	.033 to .065 mV/psi	Absolute
SPX100D	0 to 15 psi	.065 to .13 mV/psi	Differential/Gage
SPX200D	0 to 30 psi	.033 to .065 mV/psi	Differential/Gage

Table I: Pressure transducers

you would like a list of the full range.

Having got our measurement of pressure what can we do with it? It can be a useful addition to the anemometer (June 1985) in a computerised weather station. Although the more expensive sensors will give better results you could get some useful results using the low cost SPX sensors.

The SPX100D would give normal atmospheric pressure of 14.7 psi in the middle of its range. Atmospheric pressure is normally measured in millibars (mb) but as you will have to calibrate the sensor it does not matter.

The SI unit of pressure is the Pascal and 1 psi is equal to $6\cdot894757 \times 10^3$ Pascal (Pa). The Pascal is in the unit of Newtons per square Metre (NM^{-2}). Finally there are $100NM^{-2}$ in 1 millibar.

Normally atmospheric pressure ranges between 990 to 1030 mb, but on a barometer I saw the range was 880 to 1090 mb. Nevertheless there is adequate range using the analogue input port or even more accuracy using the Body Build DVM.

You will have to calibrate the system and the calibration will take care of those messy conversions of units. All you need is a measure of pressure in what ever system you like. There are two ways you can calibrate it, one using a barometer and the other by using the local weather forecasts.

If you make the gain of the amplifier about 220 and use the times 10 input, I have calculated that you will be able to get accuracy of about 1 mb. That is if you read the analogue input port with the ADVAL(2) AND 255 statement.

In order to calibrate it you will need to take two readings at known pressures. The conversion will be in the form of Pressure=C+Reading*F where C and F are constants of conversion.

The task of calibration is to find these constants. Suppose you have taken two readings labelled R1 and R2, associated with each reading is a pressure P1 and P2. Now the value of F can be found by using: F=(P1–P2)/(R1–R2).

As there is an inverting amplifier the value for F will be negative. Once you have found F you can find C by: C=P1–R1*F.

You now have the constants to build into your monitoring program. Remember – after calibration do not alter the offset control VR1 otherwise the value of the constant C will be changed. The constant F is governed by the gain of the amplifier.

When the atmospheric pressure is used for weather forecasting it is normalised so that the value used was as if it were measured at sea level. You see, as you increase in height, atmospheric pressure drops by about one millibar for every 10 metres.

If you are using a barometer you can adjust the pressure reading according to your height above sea level. You can easily find this by looking at an ordnance survey map. If you use the local weather office to get your readings these will already have been normalised, so you don't have to bother.

Once you have set up the system make sure you do not handle the pressure sensor as you will increase its temperature and not the temperature of the compensating current source. I have not tried the SPX sensor and amplifier circuit for long term stability but the data sheets suggest that it should be all right.

Another application of pressure measurement could be to weigh an object by connecting it up to an old inner tube. If you place an object on a partially inflated inner tube or bag the pressure is increased proportionally to the weight of an object. What about a gauge that measures your lung capacity by measuring how hard you can suck or blow?

A pressure gauge inserted in place of a spark plug in an engine can indicate compression ratios and point to a damaged cylinder head gasket or worn piston rings. Placed around the carburettor or exhaust a pressure gauge can give an indication of a car's performance. In fact, the SPX series of transducers were specailly made for the motor industry.

Many school physics experiments can be computerised such as Boyle's law and the Stirling engine. Like all Body Build articles, the fun begins when you let loose your creativity on it.

● *See you next month – when the pressure is off.*

Body Build Pack 31: Pack 31a components to build Figure V £3.50. Pack 31b a pressure transducer type LX06015A £44; LX06030A £44; LX06001G £62; LX06005G £40; LX06015G £40; LX06100G £55; LX06001D £62; LX06005D £44; LX06015D £40; LX06030D £40; SPX200A £15.50 includes LM334 and two resistors; SPX100D £25 includes LM334 and two resistors; SPX200D £25 includes LM334 and two resistors.

All prices include Vat and P&P. Educational establishments: Official orders accepted.

PROBLEM

I WAS watching the special edition of Micro Live on television about synthesising music using a personal computer. I have a BBC Micro and an electric piano at home, and I would really like to be able to link the two together.

My piano has the Midi input/output socket that they talked about on the show. My father and I have tried all the local computer stores to find out how to do this but nobody seems to know how. I would be grateful if you could help me. – Tony Lancaster, Haverhill, Suffolk.

SOLVED

The Midi interface is a serial protocol like the RS432 on the back of the BBC Micro. It uses TTL levels and not the ± 5 volts used in the RS432. It also runs at 31.25k baud, a speed that cannot be achieved on the BBC Micro without some modification.

This modification would mean you lose the ability to use tape to load and save programs. The alternative is to build an add-on to the 1MHz bus. I might do this in the future, but it depends upon demand.

In the meantime The London Rockshop at 26 Chalk Farm Road, London NW1 makes a BBC Midi interface (pricey) and the magazine Electronics and Music Maker, Alexander House, 1 Milton Road, Cambridge CB4 1UY published details of an interface some time early in 1985. I think you could get a kit for about £50.

Mike Cook

Ghouls of Azzod

Help explorer Azzo
this block-busting,

LOSING his foothold, explorer Azzo plunged deep into the sea below, which fortunately opened beneath him, revealing a long chute which carried him to an underwater city.

And there he was incarcerated in a spooky manor called Azzod.

Your aim is to recreate Azzo's explorations and help him escape from the four levels of Azzod. To do this you must pass over all the platforms and cover them with a magic dust.

As you move through the levels you will encounter many hazards, including cat and dog monsters, bouncing balls, moving floorboards and a multitude of venomous plants.

The program uses almost all of the BBC Micro's memory and disc users will have to download it to &E00. It must be typed in exactly as shown with no extra spaces, as these will almost certainly result in "No room" error messages.

Save the program before you run it as it contains a self-deletion routine to remove the initialisation section when finished with.

Keys:

Z	Left
X	Right
Shift	Jump

VARIABLES

LI%	Lives left.
X%,Y%	Man's screen coordinates.
SO	Score.
SC%	Screen.
B(4)	Ball's orientations.
M$(11)	Man's orientations.
C(9)	Screen's colour.
S$(4)	Screen's titles.
PLAT%	Number of floors.
R%	Man's orientation printed.
A%,B%	Floor boundaries.
D%	Moving floor's X coordinate.
E%	Step size for moving floor.
J%,I%	Ball's boundaries.
F%,G%	Ball's X,Y coordinates.
H%	Ball's step size.
K%	Ball's orientation to be printed.
L%,M%	X and Y coordinates of platform.
V%,W%	Boundaries for moving platform.
U%	Step size for moving floor.

PROCEDURES

d	Initialises main variables.
m	Displays screen.
l	Moves man left.
r	Moves man right.
h	Fills in platform.
f	Drops man.
j	Makes man jump.
g	Calls hazards.
x	Moves floor.
y	Moves platform.
z	Moves ball.
tim	Reduces strength by small amounts.
str	Reduces strength by large amounts.
o	Lose life.
i	Displays title page.

escape from the monster-ridden manor of Azzod in memory-gobbling epic from **PETER AZZOPARDI**

Full listing starts on Page 116

Some of the features of the new Mini Office II

With the word processor you can . . .

★ *Select most features by menu or embedded commands.* ★ *Transfer records from database for personalised circulars.* ★ *Choose from three methods of display: 20 column (double size characters), 40 column, 80 column (20 and 80 columns only on 'B' Plus and 6502 Second Processor).*
★ *Centre, indent, tab, justify and merge text.* ★ *Insert, copy, move or delete blocks of text.*
★ *Select two editing modes: insert or overwrite.* ★ *Search and replace globally or selectively.* ☆ *Check typing speed in words per minute.* ☆ *See on-screen real-time clock, plus word and character count.*

With the database you can . . .

★ *Select five field types (Alpha, Decimal, Date, Integer, Formula).*
★ *Perform all arithmetic functions.*
★ *Search over multiple fields.*
★ *Mark individual records.* ★ *Use flexible printout routine.* ★ *Pass records to the word processor.* ☆ *Carry out powerful multi-field record sorting.*

With the spreadsheet you can . .

★ *Total rows and columns, with easy selection of criteria.* ★ *Copy formulae either absolutely or relatively.* ★ *Print out all or part of the spreadsheet.*
★ *Move directly to a specific location.*
★ *Select movement of cursor.*
☆ *Recalculate automatically or manually.*

With the label printer you can . . .

★ *Design any style of label with the versatile editor.* ★ *Select label size and sheet format.* ★ *Read directly from database files.*

With the graphics pack you can . . .

★ *Enter data directly or take from spreadsheet.* ★ *Use icon type menus.* ☆ *Choose pie chart, bar chart or line graph.* ★ *Display up to three line graphs simultaneously.* ★ *Display up to three bar charts side by side or stacked.* ★ *Choose bar charts in either 2D or 3D.* ★ *Draw compacted or emphasised pie charts.* ★ *Define your own style of shading.* ★ *Dump graphs directly to Epson or Seikosha compatible printer.*

With the comms pack you can . . .

★ *Access MicroLink or Telecom Gold with only two key presses.* ★ *Select protocols as required.* ★ *Change modes while on-line.* ★ *Store text directly to memory or disc.* ★ *Use one-key 'Stop' command.*

With all the modules you can . . .

★ *Use the AMX Mouse.* ★ *Choose foreground and background colour in most modes.* ★ *Make more efficient use of memory and faster response time thanks to machine code content.* ★ *Take advantage of the extra memory of the BBC B Plus and 6502 Second Processor.*

★ **Features that were not in the original Mini Office.**

Database proudly presents..

When it was launched in October, 1984, Mini Office was acclaimed as the most innovative software of the decade, creating new standards in serious programming – and at a price everyone could afford.

Since then it has become far and away one of the best-selling packages ever created for the BBC Micro, frequently displacing games from their position in the Top Ten. And, unlike most software releases, it is still as much in demand now as it was 15 months ago.

Which is why there has been so much speculation throughout the industry about what the much-rumoured Mini Office II would be like. After all, how do you beat a best-seller?

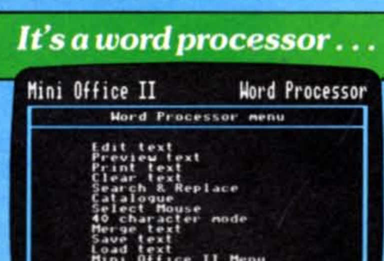
The answer is – by making it even better! And the new Mini Office II is certainly that . . . in every respect.

While still retaining upward compatibility with the original Mini Office, it is packed with a host of new features that have been made possible by the tremendous strides made in programming techniques in the last 12 months.

The result is the most comprehensive suite of business programs ever produced for the BBC Micro – and still the best value ever.

And it comes with a no-nonsense easy-to-follow guide to business computing that will take you step by step through all the many features, showing you how to use their huge potential to the full.

It's a word processor . . .

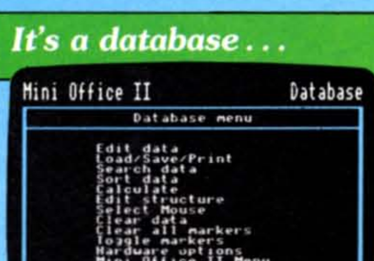


```
Mini Office II           Word Processor
          Word Processor menu

          Edit text
          Preview text
          Print text
          Clear text
          Search & Replace
          Catalogue
          Select Mouse
          40 character mode
          Merge text
          Save text
          Load text
          Mini Office II Menu

        Use cursor keys to choose
           then press RETURN
      (c) Database Software 1986
```

It's a database . . .

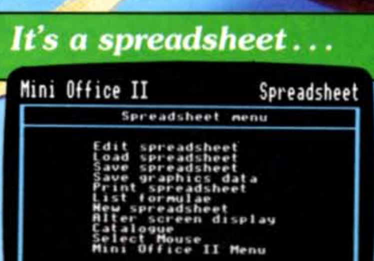


```
Mini Office II                 Database
             Database menu

          Edit data
          Load/Save/Print
          Search data
          Sort data
          Calculate
          Edit structure
          Select Mouse
          Clear data
          Clear all markers
          Toggle markers
          Hardware options
          Mini Office II Menu

        Use cursor keys to choose
           then press RETURN
      (c) Database Software 1986
```

It's a spreadsheet . . .



```
Mini Office II              Spreadsheet
            Spreadsheet menu

          Edit spreadsheet
          Load spreadsheet
          Save spreadsheet
          Save graphics data
          Print spreadsheet
          List formulae
          New spreadsheet
          Alter screen display
          Catalogue
          Select Mouse
          Mini Office II Menu

        Use cursor keys to choose
           then press RETURN
      (c) Database Software 1986
```

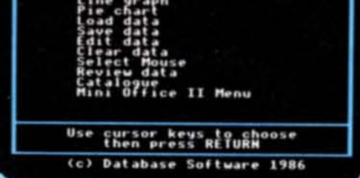
It's MINI OFFICE II on the BBC Micro! *All 6 modules*

Software

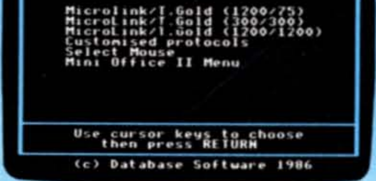
ORDER FORM ON PAGE 143

Mini Office II
Main menu
Word Processor
Database
Spreadsheet
Graphics
Communications
Label Printer
Exit Mini Office II
Use cursor keys to choose then press RETURN
(c) Database Software 1986

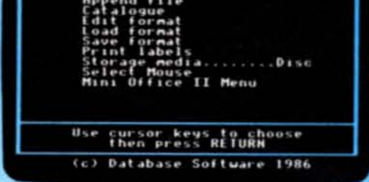
It's a graphics pack . . .


Mini Office II
Graphics
Graphics menu
Bar chart
Line graph
Pie chart
Load data
Save data
Edit data
Clear data
Select Mouse
Review data
Catalogue
Mini Office II Menu
Use cursor keys to choose then press RETURN
(c) Database Software 1986

It's a comms pack . . .


Mini Office II
Communications
Communications menu
MicroLink/T.Gold (1200/75)
MicroLink/T.Gold (300/300)
MicroLink/T.Gold (1200/1200)
Customised protocols
Select Mouse
Mini Office II Menu
Use cursor keys to choose then press RETURN
(c) Database Software 1986

It's a label printer . . .


Mini Office II
Label Printer
Label Printer menu
Load file
Append file
Catalogue
Edit format
Load format
Save format
Print labels
Storage media........Disc
Select Mouse
Mini Office II Menu
Use cursor keys to choose then press RETURN
(c) Database Software 1986

for £14.95 (cassette), £16.95 (5¼" disc), £19.95 (3" disc)

From Page 73

Program I

```
   10 REM Additional fonts
   20 REM Normal, italic, feint,
   30 REM reverse, sideways, double
   40 REM width or any combination
   50 REM (C) The Micro User
   60 REM By Pete Gaunt
   70 REM Code intercepts oswrch vect
or
   80 REM and should work with any
   90 REM program which uses oswrch i
n
  100 REM "legal" way.
  110 :
  120 REM Assembled code is saved aft
er
  130 REM listing is run. Code must r
un
  140 REM in the I/O if a second proc
  150 REM in use; top two bytes of lo
ad
  160 REM address set to &FFFF to
  170 REM ensure this.
  180 :
  190 REM If this listing is run in
  200 REM second proc raise PAGE abov
e
  210 REM &C00 first.
  220 :
  230 REM See article for details.
  240 :
  250 :
  260 REM Assembly address is OK if
  270 REM cassette, RS423, speech or
  280 REM envelopes 5 - 15 not in use
.
  290 code=&900
  300 osword=&FFF1
  310 oswrch=&FFEE
  320 osbyte=&FFF4
  330 wrchv=&20E
  340 REM &281 is user flag set by
  350 REM Osbyte 1 and 241
  360 flag=&281
  370 FOR I%=0 TO 2 STEP 2
  380 P%=code
  390 [OPT I%
  400 .swap \change vectors
  410 SEI
  420 LDAwrchv
  430 STAoldwrchv
  440 LDAwrchv+1
  450 STAoldwrchv+1
  460 LDA#intercept MOD &100
  470 STAwrchv
  480 LDA#intercept DIV &100
  490 STAwrchv+1
  500 LDA#0
  510 STAflag
  520 CLI
  530 RTS
  540 .oldwrchv
  550 BRK
  560 BRK
  570 .intercept
  580 STAbuffer
  590 TXA
  600 PHA
  610 TYA
  620 PHA
  630 LDA#1
  640 BITflag
  650 BEQdo_nothing
  660 .on
  670 LDA#218  \check that VDU queue
is
  680 LDX#0    \empty (char not part
of
  690 LDY#255  \graphics sequence etc
.)
  700 JSRosbyte
  710 CPX#0
  720 BNEdo_nothing
  730 LDAbuffer
  740 .check_char
  750 CMP#32
  760 BCCdo_nothing
  770 CMP#127  \delete
  780 BNEchar_ok
  790 LDA#128
  800 BITflag
  810 BEQdo_nothing  \double width
  820 JSRdn2         \needs extra
  830 JMPdo_nothing  \delete
  840 .char_ok
  850 JSRcheck_toggles
  860 BCSend
  870 LDA#254 \any font bits set?
  880 BITflag
  890 BEQdo_nothing
  900 .bits_set
  910 JSRfonts
  920 .end
  930 PLA
  940 TAY
  950 PLA
  960 TAX
  970 LDAbuffer
  980 RTS
  990 .do_nothing
 1000 PLA
 1010 TAY
 1020 PLA
 1030 TAX
 1040 .dn2
 1050 LDAbuffer
 1060 .oldoswrch
 1070 \a JSR to here by-passes code
 1080 JMP(oldwrchv)
 1090 .check_toggles \check if char
 1100 LDX#6          \is a toggle cha
r
 1110 .ctloop
 1120 LDAtog_chars,X
 1130 CMPbuffer
 1140 BEQtog_found
 1150 DEX
 1160 BMInot_toggles
 1170 JMPctloop
 1180 .tog_found
 1190 INX
 1200 LDA#1
 1210 .tfl   \if toggle char found
 1220 ASL A  \convert position in lis
t
 1230 DEX    \to bit value
 1240 BNEtfl
 1250 EORflag
 1260 STAflag
 1270 SEC
 1280 JMPendct
 1290 .not_toggles
 1300 CLC
 1310 .endct
 1320 RTS
 1330 .tog_chars        \chars used fo
r
 1340 BRK:BRK:BRK:BRK  \toggles store
d
 1350 BRK:BRK:BRK      \here
 1360 .fonts
 1370 LDA#&A
 1380 LDX#buffer MOD &100
 1390 LDY#buffer DIV &100
 1400 JSRosword   \char def returned
 1410 LDA#2       \at buffer+1
 1420 BITflag
 1430 BEQcheck_feint
 1440 \for italics rotate top three
 1450 \three lines of char right and
lower
 1460 \three lines left
 1470 .italics
 1480 LDX#3
 1490 .it_loop
 1500 CLC
 1510 RORbuffer,X
 1520 CLC
 1530 ROLbuffer+5,X
 1540 DEX
 1550 BNEit_loop
 1560 .check_feint
 1570 LDA#4
 1580 BITflag
```

```
1590 BEQcheck_ul
1600 \for feint shift each line of
1610 \char left and AND with origina
l
1620 .feint
1630 LDX#8
1640 .floop
1650 LDAbuffer,X
1660 ASL A
1670 ANDbuffer,X
1680 LSR A
1690 STAbuffer,X
1700 DEX
1710 BNEfloop
1720 .check_ul
1730 LDA#8
1740 BITflag
1750 BEQcheck_reversed
1760 \underline adds dotted line to
1770 \bottom line of char. Dotted
1780 \line allows descenders to show
1790 .underline
1800 LDA#170
1810 ORAbuffer+8
1820 STAbuffer+8
1830 .check_reversed
1840 LDA#16
1850 BITflag
1860 BEQcheck_sideways
1870 \reversed turns all on bits off
1880 \and all off bits on
1890 .reverse
1900 LDX#8
1910 .revloop
1920 LDAbuffer,X
1930 EOR#&FF
1940 STAbuffer,X
1950 DEX
1960 BNErevloop
1970 .check_sideways
1980 LDA#96
1990 BITflag
2000 BEQcheck_double
2010 \sideways rotates each line
2020 \left or right into accumulator
2030 \and stores at store. When all
2040 \eight lines are done store is
2050 \copied back to buffer
2060 .sideways
2070 LDY#7
2080 .rotloop1
2090 LDX#8
2100 .rotloop2
2110 PHA
2120 LDA#64
2130 BITflag
2140 BEQclockwise
2150 PLA
2160 ASLbuffer,X
2170 ROR A
2180 JMPnext_byte
2190 .clockwise
2200 PLA
2210 LSRbuffer,X
2220 ROL A
2230 .next_byte
2240 DEX
2250 BNErotloop2
2260 STAstore,Y
2270 DEY
2280 BPLrotloop1
2290 LDX#7  \copy store to buffer
2300 .moveloop
2310 LDAstore,X
2320 STAbuffer+1,X
2330 DEX
2340 BPLmoveloop
2350 .check_double
2360 LDA#128
2370 BITflag
2380 BEQprint_font
2390 \double width creates a copy of
2400 \the left side of char in buffe
r
2410 \with each bit doubled and a
2420 \copy of right side of char in
2430 \store with each bit doubled
2440 .double_width
2450 LDX#7
2460 .dwloop1
2470 LDAbuffer+1,X
2480 STAstore,X
2490 DEX
2500 BPLdwloop1
2510 LDX#7
2520 .dwloop2
2530 LDAbuffer+1,X
2540 STAtemp
2550 STAtemp+1
2560 STAtemp+2
2570 STAtemp+3
2580 LDY#4
2590 .dwloop3
2600 LDAbuffer+1,X
2610 ASLtemp
2620 ROL A
2630 ASLtemp+1
2640 ROL A
2650 STAbuffer+1,X
2660 LDAstore,X
2670 LSRtemp+2
2680 ROR A
2690 LSRtemp+3
2700 ROR A
2710 STAstore,X
2720 DEY
2730 BNEdwloop3
2740 DEX
2750 BPLdwloop2
2760 .print_font
2770 \redefine char 255 using the
2780 \rearranged bytes in buffer
2790 LDX#(buffer+1) MOD &100
2800 LDY#(buffer+1) DIV &100
2810 JSRredefine
2820 LDA#255
2830 JSRoldoswrch \print char 255
2840 LDA#128
2850 BITflag
2860 BEQnot_double
2870 \if double flag set redefine
2880 \char 255 using bytes at store
2890 LDX#store MOD &100
2900 LDY#store DIV &100
2910 JSRredefine
2920 LDA#255      \print right side
2930 JSRoldoswrch \of double char
2940 .not_double
2950 LDA#96
2960 BITflag  \if not sideways then
2970 BEQendpf \end
2980 \if sideways then get cursor to
2990 \right place
3000 LDA#8
3010 JSRoldoswrch
3020 LDA#128
3030 BITflag
3040 BEQnot_double_side
3050 LDA#8
3060 JSRoldoswrch
3070 .not_double_side
3080 LDA#64
3090 BITflag
3100 BEQnot_anti
3110 LDA#11
3120 JMPpside
3130 .not_anti
3140 LDA#10
3150 .pside
3160 JSRoldoswrch
3170 .endpf
3180 RTS
3190 .redefine
3200 STXredef+1  \X & Y point to
3210 STYredef+2  \definition address
3220 LDA#23
3230 JSRoldoswrch
3240 .charno
3250 LDA#255
3260 JSRoldoswrch
3270 LDX#0
3280 .redef
3290 \operand set by calling routine
3300 LDA&FFFF,X
3310 JSRoldoswrch
```

→

From Page 109

```
 3320 INX
 3330 CPX#8
 3340 BNEredef
 3350 RTS
 3360 .buffer
 3370 BRK:BRK:BRK:BRK:BRK
 3380 BRK:BRK:BRK:BRK
 3390 .temp
 3400 BRK:BRK:BRK:BRK
 3410 .store
 3420 BRK:BRK:BRK:BRK
 3430 BRK:BRK:BRK:BRK
 3440 ]
 3450 NEXT
 3460 :
 3470 FOR N%=0 TO 6
 3480 READ N$
 3490 tog_chars?N%=ASCN$
 3500 NEXT
 3510 :
 3520 REM Characters used as toggles
 3530 DATA "\","¦","_","{","[","]","}
"
 3540 :
 3550 REM Check code length
 3560 IF P%-code<>&1EC THEN VDU7:PRIN
T"Error: code should be &1EC bytes":E
ND
 3570 :
 3580 REM Set top two bytes of load
 3590 REM address to &FFFF
 3600 R%=code OR &FFFF0000
 3610 :
 3620 DIM oscli 41
 3630 $oscli="*SAVE FONTS "+STR$~code
+" "+STR$~P%+" "+STR$~R%+" "+STR$~R%
 3640 X%=oscli MOD &100
 3650 Y%=oscli DIV &100
 3660 CALL&FFF7
```

Program II

```
   10 REM Demonstration of "FONTS"
   20 REM (C) The Micro User
   30 REM By Pete Gaunt
   40 REM *RUN FONTS before running
   50 REM this demo.
   60 REM Remember bit 0 must be on
   70 REM before any of the fonts wil
l
   80 REM work.
   90 MODE0
  100 VDU19,0,2;0;19,1,0;0;
  110 REM Bits 0,4,5,7
  120 REM Reversed, sideways
  130 REM (clockwise), double width.
  140 *FX1 177
  150 PRINTTAB(77,1)"Demonstration"
  160 PRINTTAB(75,1)"of fonts     "
  170 PRINTTAB(73,1)"routine      "
  180 REM Bits 0,2,6,7
  190 REM Feint, sidways (anticlock),
  200 REM double width
  210 *FX1 197
  220 PRINTTAB(67,13)"Demonstration"
  230 PRINTTAB(69,13)"of fonts"
  240 PRINTTAB(71,13)"routine"
  250 REM All bits off, normal
  260 *FX1
  270 PRINTTAB(0,0)"Normal: The quick
 brown fox jumps over the lazy dog"
  280 REM Bits 0,1
  290 REM Normal italics
  300 *FX1 3
  310 PRINT'"Normal italics: The quic
k brown fox jumps over the lazy dog"
  320 REM Bits 0,2
  330 REM Normal feint
  340 *FX1 5
  350 PRINT'"Normal feint: The quick
brown fox jumps over the lazy dog"
  360 REM Bits 0,3
  370 REM Normal underlined
  380 *FX1 9
  390 PRINT'"Normal underlined: The q
uick brown fox jumps over the lazy do
g"
  400 REM Bits 0,4
  410 REM Normal reversed
  420 *FX1 17
  430 PRINT'"Normal reversed: The qui
ck brown fox jumps over the lazy dog"
  440 REM Bits 0,7
  450 REM Double width
  460 *FX1 129
  470 PRINT'"Double: The quick brown
fox"'"jumps over the lazy dog"
  480 REM Bits 0,1,7
  490 REM Italic, double width
  500 *FX1 131
  510 PRINT'"Double italic: The quick
 brown"'"fox jumps over the lazy dog"
  520 REM Bits 0,2,7
  530 REM Feint, double width
  540 *FX1 133
  550 PRINT'"Double feint: The quick
brown fox jumps"'"over the lazy dog"
  560 REM Bits 0,3,7
  570 REM Underlined, double width
  580 *FX1 137
  590 PRINT'"Double underlined: The q
uick brown fox"'"jumps over the lazy
dog"
  600 REM Bits 0,4,7
  610 REM Reversed, double width
  620 *FX1 145
  630 PRINT'"Double reversed: The qui
ck brown fox"'"jumps over the lazy do
g"
  640 REM All bits off; normal
  650 *FX1
  660 PRINT'"Normal again:  The quick
 brown fox jumps over the lazy dog"
  670 REM Bit 0
  680 REM Normal until one of toggle
  690 REM characters is encountered
  700 *FX1 1
  710 PRINT'"The quick brown, \italic
, _underlined, }double fox}\_ jumps o
ver the ¦feint, }double, {reversed do
g¦{}"
  720 REM All bits off
  730 *FX1
  740 VDU31,0,31
```

This listing is included in this month's cassette tape offer. See order form on Page 143.

PROBLEM

I HAVE a Watford single density DFS and Shugart disc drives. I had just written to Watford to complain because some of the DFS commands refused to work when your reply to Alister Hart was published in the December issue of *The Micro User*.

I dived into my drives and removed the resistor pack in drive 0 and now everything works perfectly. Many thanks. However I cannot find the switch labelled MUX. There is one labelled MX. Is this the same?

It is presently set to the left (west) on both drives. Is this correct? – Bill Cooke, Liverpool.

SOLVED

Yes it sounds like MX is the same as MUX. It stands for multiplex and means that when a drive is not enabled it is not driving the input lines to the disc controller.

In a single drive system it does not matter which way round it goes but it must be set correctly on a multi drive system. The symptom of getting it wrong is that neither drive will work properly.

From Page 69

```
   10 REM *********************
   20 REM *     MOUSETRAP     *
   30 REM *        By         *
   40 REM *   GEOFF TURNER    *
   50 REM * (c)The Micro User *
   60 REM *********************
   70 MODE 7
   80 VDU23,1,0;0;0;0;
   90 PROCinstructions
  100 REM INITITIALISE VARIABLES
  110 ENVELOPE 1,5,-45,1,2,-9,0,0,80,
0,0,-126,126,126
  120 ENVELOPE 2,1,43,0,0,100,0,0,126
,0,0,-126,126,126
  130 ENVELOPE 3,1,70,16,2,2,0,0,126,
0,0,-126,126,126
  140 ENVELOPE 4,1,-36,-93,-9,11,0,0,
126,0,0,-126,126,126
  150 HI%=0
  160 H%=8:V%=4
  170 L%=2500
  180 E%=0
  190 XL%=1263:YL%=40
  200 VDU23,224,192,224,176,252,239,1
91,252,192
  210 MODE2
  220 VDU23,1,0;0;0;0;
  230 REM DRAW SCREEN
  240 GCOL0,1
  250 MOVE0,32
  260 DRAW0,1023
  270 DRAW1279,1023
  280 DRAW1279,32
  290 MOVE0,32:DRAW 1279,32
  300 MOVE0,959:DRAW79,959
  310 MOVE0,955:DRAW79,955
  320 X%=8
  330 Y%=36
  340 GCOL0,6
  350 PLOT69,X%,Y%
  360 PROCcheese
  370 COLOUR6
  380 PRINTTAB(3,31);"Line left ";L%;
  390 REM MAIN PROGRAM LOOP
  400 REPEAT
  410 IF X%<16 THEN H%=8:SOUND 1,1,26
,3
  420 IF X%>1263 THEN H%=-8:SOUND 1,1
,26,3
  430 IF Y%<40 THEN V%=4:SOUND 1,1,26
,3
  440 IF Y%>1015 THEN V%=-4:SOUND 1,1
,26,3
  450 XX%=X%+H%
  460 YY%=Y%+V%
  470 IF POINT(XX%,YY%)>0 PROCtest:XX
%=X%:YY%=Y%
  480 IF POINT(XX%,YY%)=3 PROCclear:P
ROCcheese
  490 PLOT69,XX%,YY%
  500 GCOL0,0
  510 PLOT69,X%,Y%
  520 GCOL0,6
  530 X%=XX%:Y%=YY%
  540 IF X%<79 AND Y%>959 PROCtime EL
SE TIME=0
  550 PROCline
  560 UNTIL E%=1 OR L%<1
  570 MODE6
  580 VDU23,1,0;0;0;0;
  590 IF E%=1 PROCwin ELSE PROClose
  600 GOTO 160
  610 REM PROCEDURES
  620 DEFPROCline
  630 HL%=0:VL%=0
  640 IF INKEY(-98) AND XL%>15 THEN H
L%=-8:GOTO700
  650 IF INKEY(-67) AND XL%<1267 THEN
 HL%=8 :GOTO700
  660 IF INKEY(-73) AND YL%<1015 THEN
 VL%=8:GOTO 700
  670 IF INKEY(-105)AND YL%>39 THEN V
L%=-8:GOTO700
  680 IF INKEY(-99) THEN PROCclear:PR
OCcheese
  690 ENDPROC
  700 GCOL0,2
  710 MOVEXL%,YL%
  720 XL%=XL%+HL%
  730 YL%=YL%+VL%
  740 IF POINT(XL%,YL%)>0 THEN XL%=XL
%-HL%:YL%=YL%-VL%:SOUND 1,-7,50,1 ELS
E DRAW XL%,YL%:L%=L%-1:PRINTTAB(13,31
);L%;SPC(1);
  750 ENDPROC
  760 DEFPROCtest
  770 IF POINT(XX%,YY%)=3 SOUND 1,2,1
7,10:PROCclear:PROCcheese:ENDPROC
  780 SOUND 1,1,26,3
  790 IF H%=8 AND V%=-4 PROCtest1 :EN
DPROC
  800 IF H%=-8 AND V%=-4 PROCtest2:EN
DPROC
  810 IF H%=-8 AND V%=4 PROCtest3 :EN
DPROC
  820 IF H%=8 AND V%=4 PROCtest4  :EN
DPROC
  830 DEFPROCtest1
  840 H%=-8:V%=4
  850 IF POINT(XX%-8,YY%)=0 THEN V%=-
4
  860 IF POINT(XX%,YY%+4)=0 THEN H%=8
  870 IF H%=8 AND V%=-4 THEN H%=-8:V%
=4
```

```
  880 ENDPROC
  890 DEFPROCtest2
  900 H%=8:V%=4
  910 IF POINT(XX%+8,YY%)=0 THEN V%=-
4
  920 IF POINT(XX%,YY%+4)=0 THEN H%=-
8
  930 IF H%=-8 AND V%=-4 THEN H%=8:V%
=4
  940 ENDPROC
  950 DEFPROCtest3
  960 H%=8:V%=-4
  970 IF POINT(XX%+8,YY%)=0 THEN V%=4
  980 IF POINT(XX%,YY%-4)=0 THEN H%=-
8
  990 IF H%=-8 AND V%=4 THEN H%=8:V%=
-4
 1000 ENDPROC
 1010 DEFPROCtest4
 1020 H%=-8:V%=-4
 1030 IF POINT(XX%-8,YY%)=0 THEN V%=4
 1040 IF POINT(XX%,YY%-4)=0 THEN H%=8
 1050 IF H%=8 AND V%=4 THEN H%=-8:V%=
-4
 1060 ENDPROC
 1070 DEFPROCclear
 1080 VDU24,8;36;1271;1019;
 1090 CLG
 1100 GCOL0,1
 1110 MOVE0,959:DRAW79,959
 1120 MOVE0,955:DRAW79,955
 1130 VDU26
 1140 ENDPROC
 1150 DEFPROCtime
 1160 IF TIME>300 E%=1
 1170 ENDPROC
 1180 DEFPROCcheese
 1190 COLOUR3
 1200 FOR I%=1 TO 5
 1210 CX%=RND(16+2):CY%=RND(29)
 1220 PRINTTAB(CX%,CY%);CHR$(224)
 1230 NEXT
 1240 COLOUR6
 1250 ENDPROC
```

→

From Page 111

```
 1260 DEFPROCwin
 1270 SOUND1,3,100,10
 1280 FOR I%=1 TO 3000:NEXT
 1290 CLG
 1300 PRINTTAB(8,2);"YOU TRAPPED THE
MOUSE !"
 1310 PRINTTAB(9,6);"AND SCORED ";L%;
" POINTS"
 1320 IF L%>HI% HI%=L%
 1330 PRINTTAB(12,10);"BEST SO FAR ";
HI%
 1340 PRINTTAB(7,14);"PRESS SPACE TO
PLAY AGAIN"
 1350 REPEAT UNTIL INKEY(-99)
 1360 REPEAT UNTIL NOT INKEY(-99)
 1370 ENDPROC
 1380 DEFPROClose
 1390 FOR I%=1 TO 3000:NEXT
 1400 SOUND 0,4,50,30
 1410 CLG
 1420 PRINTTAB(13,2);"YOU BLEW IT !"
 1430 PRINTTAB(10,4);"YOU RAN OUT OF
LINE !"
 1440 PRINTTAB(7,10);"PRESS SPACE TO
PLAY AGAIN"
 1450 REPEAT UNTIL INKEY(-99)
 1460 REPEAT UNTIL NOT INKEY(-99)
 1470 ENDPROC
 1480 DEFPROCinstructions
 1490 PRINTTAB(13,0);"MOUSE TRAP"
 1500 PRINTTAB(13,1);"----------"
 1510 PRINTTAB(10,3);"By  Geoff Turne
r"
 1520 PRINT
 1530 PRINT"Chase the bouncing mouse
into the trap"
 1540 PRINT"at the top left of the sc
reen."
 1550 PRINT"Use  Z,X,/,: keys to draw
 lines to"
 1560 PRINT"trap the mouse."
 1570 PRINT
 1580 PRINT"If the mouse eats a piece
 of cheese"
 1590 PRINT"it will clear the lines f
rom the "
 1600 PRINT"screen.  The player may a
lso clear"
 1610 PRINT"the screen if necessary b
y pressing"
 1620 PRINT"the space bar."
 1630 PRINT
 1640 PRINT"The game ends when the mo
use is trapped"
 1650 PRINT"for three seconds, or the
 player runs"
 1660 PRINT"out of line."
 1670 PRINT
 1680 PRINT"Lines cannot be drawn acr
oss existing"
 1690 PRINT"lines, or through pieces
of cheese."
 1700 PRINT
 1710 PRINT"Press Space Bar."
 1720 REPEAT UNTIL INKEY(-99)
 1730 REPEAT UNTIL NOT INKEY(-99)
 1740 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 143.

QUAL-SOFT THOUGHTWARE Sports simulations

"A real challenge to the thinking football fan . . . Bobby Robson could do worse than have a crack at this in his preparation for the World Cup".

AMSTRAD ACTION REVIEW Jan '86

QUAL-SOFT COMMENT: ***At last an INTELLIGENT management game for the knowledgeable soccer enthusiast!***

In 1966 Alf Ramsey proved that English club soccer players, with intelligent management, could not only dominate European club football, but could take on, and beat the rest of the world at International level. Could you do the same in . . . .

Tape 1 (Qualifiers)
+ **Tape 2** (Finals)
+ 20 Page Booklet
£9.95

MEXICO '86*

A WORLD CUP MANAGEMENT SIMULATION

DISC
Qualifiers + Finals
+ 20 Page Booklet
£12.95

Summer 1984 and English International football is at its lowest ebb. We have failed to qualify for the European Nations Cup, and had a string of very poor International results. In a few months we will set out on the '86 World Cup qualifying trail. You have been given the most important job of restoring English pride in their football. You have a match in Paris, the USSR at Wembley, and a South American tour, to assemble a team, first to qualify, and then to beat the world's best in Mexico.

TAPE 1 (Qualifiers)

★ Current squad of 16 players + 20 user defined players.
★ Friendlies in Paris, at Wembley + South American tour.
★ ANY team formation you choose. 2 from 5 substitutes.
★ In match tactics: any no. of individual player adjustments.
★ Your qualification group: full results and table.

TAPE 2 (Finals)

★ Choose a 20 man squad to take to the finals.
★ Group of 4 prelims. 16 to final knockout comp.
★ Extra Time, PENALTY SHOOT-OUTS, where relevant.
★ Formation and strength information on opposition.
★ 2 from 9 substitutes (the FA tells us so).

ENGLAND'S GAMES: FULL PITCH, 22 MAN, 3D GRAPHICS & SOUND EFFECTS

QUAL-SOFT comments: With 5 levels of play, 12 depths of sophistication, and "fun" graphics, this game can be enjoyed by an 8 year old youngster as a "fun" game, and by the most sophisticated as a tactical/strategy challenge of the highest order.

QUALSOFT GUARANTEE: We will send your package by 1st class letter post on the day we receive your order with PO, cheque or ACCESS card authorisation. Programs are IN STOCK because we manufacture them!

* **The use of the name MEXICO '86 does not imply any association with FIFA**

QUAL-SOFT,
Dept. MU
18 Hazelmere Rd.,
Stevenage, Herts SG2 8RX.
Tel: 0438 721936

Please supply:
MEXICO '86
Electron ☐
BBC 'B' ☐ ☐ ☐
T 40 80

Name: ....
Address: ....
....
Access No. (if applicable) ....

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```
700 PHA
710 LDA #0
720 STA &72
730 PLA
740 JMP (&70)
750 \
760 .notprinteroff
770 \
780 PHA
790 TXA
800 PHA
810 TYA
820 PHA
830 PHP
840 LDA &73
850 CMP #32
860 BCS testsendflag
870 JMP quit
880 \
890 .testsendflag
900 \
910 PHA
920 LDA #1
930 CMP &72
940 BEQ send
950 PLA
960 JMP quit
970 \
980 .send
990 \
1000 PLA
1010 LDA #1
1020 STA &74
1030 LDA &7F
1040 CMP #1
1050 BEQ alreadyset
1060 LDA #1
1070 STA &7F
1080 JSR &FFEE
1090 LDA #27
1100 JSR &FFEE
1110 LDA #1
1120 JSR &FFEE
1130 LDA #75
1140 JSR &FFEE
1150 LDA #1
1160 JSR &FFEE
1170 LDA #224
1180 JSR &FFEE
1190 LDA #1
1200 JSR &FFEE
1210 JSR &FFEE
1220 \
1230 .alreadyset
1240 \
1250 LDX #chartable MOD &100
1260 LDY #chartable DIV &100
1270 LDA &73
1280 STA chartable
1290 LDA #&A
1300 JSR &FFF1
1310 LDA #128
1320 STA &75
1330 \
1340 .loop1
1350 \
1360 LDA #0
1370 STA &76
1380 LDA #128
1390 STA &77
1400 LDY #1
1410 \
1420 .loop2
1430 \
1440 LDA chartable,Y
1450 BIT &75
1460 BEQ notset
1470 CLC
1480 LDA &77
1490 ADC &76
1500 STA &76
1510 \
1520 .notset
1530 \
1540 LSR &77
1550 INY
1560 CPY #9
1570 BNE loop2
1580 LDA #1
1590 JSR &FFEE
1600 LDA &76
1610 JSR &FFEE
1620 LDA &75
1630 LSR A
1640 STA &75
1650 CMP #0
1660 BNE loop1
1670 LDA #0
1680 STA &74
1690 INC &7C
1700 LDA &7C
1710 CMP #60
1720 BNE notcr
1730 LDA #13
1740 STA &73
1750 \
1760 .quit
1770 \
1780 LDA &72
1790 CMP #1
1800 BNE notcr
1810 LDA &73
1820 CMP #13
1830 BNE notcr
1840 LDA #0
1850 STA &7F
1860 STA &72
1870 LDA #13
1880 JSR &FFEE
1890 LDA #1
1900 STA &72
1910 SEC
1920 LDA #76
1930 SBC &7C
1940 STA &7D
1950 LDA #0
1960 STA &7C
1970 \
1980 .loop3
1990 \
2000 LDA #&8
2010 STA &7E
2020 \
2030 .loop4
2040 \
2050 LDA #1
2060 JSR &FFEE
2070 LDA #0
2080 JSR &FFEE
2090 DEC &7E
2100 LDA #0
2110 CMP &7E
2120 BNE loop4
2130 DEC &7D
2140 CMP &7D
2150 BNE loop3
2160 \
2170 .notcr
2180 \
2190 LDA #6
2200 LDX &73
2210 JSR &FFF4
2220 PLP
2230 PLA
2240 TAY
2250 PLA
2260 TAX
2270 PLA
2280 LDA &73
2290 \
2300 .exit
2310 \
2320 JMP (&70)
2330 ]
2340 NEXT
2350 DIM S% 100
2360 X%=S% MOD &100
2370 Y%=S% DIV &100
2380 $S%="*SAVE DRIVER "+STR$~START+
" "+STR$~P%
2390 CALL &FFF7
2400 END
```

This listing is included in this month's cassette tape offer. See order form on Page 143.

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```
100 REM **********************
110 REM *                    *
120 REM *     NOTE PAD       *
130 REM *                    *
140 REM *  By Robin Nixon    *
150 REM *                    *
160 REM * (c) The Micro User *
170 REM *                    *
180 REM **********************
190 REM
200 MODE 7
210 oswrch=&FFEE
220 osbyte=&FFF4
230 get=&FFE0
240 FOR PASS=0 TO 3 STEP 3
250 P%=&8C0
260 [
270 OPT PASS
280 \
290 .start
300 \
310 JSR window
320 LDA #0
330 STA &72
340 STA &6
350 LDA #&6C
360 STA &7
370 LDA &20E
380 STA &70
390 LDA &20F
400 STA &71
410 LDA #main MOD &100
420 STA &20E
430 LDA #main DIV &100
440 STA &20F
450 LDA #12
460 JSR oswrch
470 LDA #&70
480 JSR save0
490 LDA #&74
500 JSR save0
510 LDA #&78
520 JMP save0
530 \
540 .main
550 \
560 PHP
570 PHA
580 LDA &72
590 BNE through
600 PLA
610 CMP #9
620 BEQ work
630 JMP through1
640 \
650 .through
660 \
670 PLA
680 \
690 .through1
700 \
710 PLP
720 JMP (&70)
730 \
740 .work
750 \
760 TXA
770 PHA
780 TYA
790 PHA
800 LDA #229
810 LDX #1
820 STX &266
830 JSR osbyte
840 JSR save
850 LDA #&70
860 STA &75
870 LDA #4
880 LDX #1
890 STX &72
900 JSR osbyte
910 LDA &318
920 STA &76
930 LDA &319
940 STA &77
950 LDA #31
960 JSR oswrch
970 LDA #0
980 STA &74
990 JSR oswrch
1000 JSR oswrch
1010 \
1020 .work1
1030 \
1040 LDA &74
1050 STA high+1
1060 LDA &75
1070 STA high+2
1080 LDA #0
1090 STA low+1
1100 LDA #&7C
1110 STA low+2
1120 JSR save
1130 \
1140 .work2
1150 \
1160 JSR get
1170 CMP #9
1180 BNE down
1190 JMP quit
1200 \
1210 .down
1220 \
1230 CMP #138
1240 BNE up
1250 LDA &319
1260 CMP #23
1270 BNE down1
1280 JSR put
1290 JSR incpointer
1300 JMP work1
1310 \
1320 .down1
1330 \
1340 LDA #10
1350 JSR oswrch
1360 JMP work2
1370 \
1380 .up
1390 \
1400 CMP #139
1410 BNE left
1420 LDA &319
1430 BNE up1
1440 JSR put
1450 JSR decpointer
1460 JMP work1
1470 \
1480 .up1
1490 \
1500 LDA #11
1510 JSR oswrch
1520 JMP work2
1530 \
1540 .left
1550 \
1560 CMP #136
1570 BNE right
1580 LDA &318
1590 BNE left1
1600 LDA &319
1610 BNE left1
1620 JSR put
1630 JSR decpointer
1640 LDA #10
1650 JSR oswrch
1660 LDA #8
1670 JSR oswrch
1680 JMP work1
1690 \
1700 .left1
1710 \
1720 LDA #8
1730 JSR oswrch
1740 JMP work2
1750 \
1760 .right
1770 \
1780 CMP #137
1790 BNE del
1800 LDA &318
1810 CMP #39
1820 BNE right1
1830 LDA &319
1840 CMP #23
1850 BNE right1
1860 JSR put
1870 JSR incpointer
1880 LDA #9
1890 JSR oswrch
1900 LDA #11
1910 JSR oswrch
1920 JMP work1
1930 \
1940 .right1
1950 \
1960 LDA #9
1970 JSR oswrch
1980 JMP work2
1990 \
2000 .del
2010 \
2020 CMP #127
2030 BNE char
2040 LDA &318
2050 BNE del1
2060 LDA &319
2070 BNE del1
2080 JSR put
2090 JSR decpointer
2100 LDA #10
2110 JSR oswrch
2120 LDA #127
2130 JSR oswrch
2140 JMP work1
2150 \
2160 .del1
2170 \
2180 LDA #127
2190 JSR oswrch
2200 \
2210 .del2
2220 \
2230 JMP work2
2240 \
2250 .char
2260 \
2270 PHA
2280 LDA &318
2290 CMP #39
2300 BNE char1
2310 LDA &319
2320 CMP #23
2330 BNE char1
2340 PLA
2350 JSR oswrch
2360 JSR put
2370 JSR incpointer
2380 LDA #11
2390 JSR oswrch
2400 JMP work1
2410 \
2420 .char1
2430 \
2440 PLA
2450 JSR oswrch
2460 CMP #13
2470 BNE del2
2480 LDA #138
2490 JMP down
2500 \
2510 .quit
2520 \
2530 JSR put
2540 JSR window
2550 LDA #31
2560 JSR oswrch
2570 LDA &76
2580 JSR oswrch
2590 LDA &77
2600 JSR oswrch
2610 LDA #&6C
2620 STA high+2
2630 LDA #&7C
2640 STA low+2
2650 LDA #4
2660 LDX #0
2670 JSR osbyte
2680 LDA #229
2690 LDX #0
2700 JSR osbyte
2710 JSR save
2720 LDA #0
2730 TAY
2740 STA &72
2750 PLA
2760 TAY
2770 PLA
2780 TAX
2790 PLP
2800 JMP (&70)
2810 \
2820 .save0
2830 \
2840 STA low+2
2850 \
2860 .save
2870 \
2880 LDY #4
2890 \
2900 .loop1
2910 \
2920 LDX #0
2930 \
2940 .high
2950 \
2960 LDA &7C00,X
2970 \
2980 .low
2990 \
3000 STA &6C00,X
3010 INX
3020 BNE high
3030 INC high+2
3040 INC low+2
3050 DEY
3060 BNE loop1
3070 TYA
3080 STA high+1
3090 STA low+1
3100 LDA #&7C
3110 STA high+2
3120 LDA #&6C
3130 STA low+2
3140 RTS
3150 \
3160 .incpointer
3170 \
3180 LDA &75
3190 CMP #&77
3200 BNE inc1
3210 LDA &74
3220 CMP #&F8
3230 BNE inc1
3240 \
3250 .end
3260 \
3270 LDA #7
3280 JMP oswrch
3290 \
3300 .inc1
3310 \
3320 LDA &74
3330 CLC
3340 ADC #40
3350 STA &74
3360 BCC inc2
3370 INC &75
3380 \
3390 .inc2
3400 \
3410 RTS
3420 \
3430 .decpointer
3440 \
3450 LDA &74
3460 BNE dec1
3470 LDA &75
3480 CMP #&70
3490 BEQ end
3500 \
3510 .dec1
3520 \
3530 LDA &74
3540 SEC
3550 SBC #40
3560 STA &74
3570 BCS inc2
3580 DEC &75
3590 RTS
3600 \
3610 .put
3620 \
3630 LDA &74
3640 STA low+1
3650 LDA &75
3660 STA low+2
3670 JMP save
3680 \
3690 .window
3700 \
3710 LDY #0
3720 \
3730 .windloop
3740 \
3750 LDA wind,Y
3760 JSR oswrch
3770 INY
3780 CPY #7
3790 BNE windloop
3800 RTS
3810 \
3820 .wind
3830 \
3840 ]
3850 RESTORE 3900
3860 FOR X%=P% TO P%+6
3870 READ ?X%
3880 NEXT
3890 P%=X%
3900 DATA 22,7,28,0,24,39,0
3910 NEXT
3920 DIM S% 25
3930 $S%="*SAVE SCRATCH
   "+STR$~start+" "+STR$~P%
3940 X%=S% MOD &100
3950 Y%=S% DIV &100
3960 CALL &FFF7
```

This listing is included in this month's cassette tape offer. See order form on Page 143.

PROBLEM

I HAVE been experiencing problems with my BBC Micro including corruption of write protected discs.

Any suggestions or help would be appreciated. – Brian A. French, Hove.

SOLVED

There is no way that the disc controller chip can write to a write protected disc. So you either have a faulty disc control chip or the discs are being damaged some other way, perhaps by magnetic fields from magnets.

From Page 105

```
  10 REM The Ghouls Of Azzod
  20 REM (C) The Micro User
  30 REM By P.P. AZZOPARDI
  40 REM
  50 ON ERROR PRINT"ERROR AT LINE ";
ERL:END
  60 MODE7
  70 FORP=&D01TO&D96:READ?P:NEXT
  80 DATA19,68,31,96,20,96,25,68,35,
68,30,80,30,80,35,80,35,68,35,84,35,9
2,31,84,44,91,59,91,43,72,66,92,64,72
,49,72,68,91,83,91,67,72,90,92,88,72,
73,72,91,91,95,95,92,96,112,92,108,96
,112,96,91,72,95,68,92,68,100,68,112,
71,112,68,96,76,96
  90 DATA87,100,91,100,91,103,91,96,
76,96,76,103,91,100,72,100,72,103,91,
107,87,100,72,103,72,107,88,103,72,10
7,76,107,88,132,68,136,72,136,68,117,
96,136,96,136,91,136,84,132,92,136,96
,120,76,120,89,130,73,120,89,128,88,1
30,73,130,73,128
  100 DATA88,130,84,130,73,131,76,131
,84
  110 VDU23,224,0,96,240,240,124,96,8
4,62
  120 VDU23,225,62,60,24,56,124,68,84
,214
  130 VDU23,226,222,94,120,120,48,48,
0,56
  140 VDU23,227,62,60,24,56,56,108,11
0,183
  150 VDU23,228,251,60,58,54,118,166,
192,103
  160 VDU23,229,62,60,24,56,124,118,1
10,109
  170 VDU23,230,235,220,46,54,118,166
,192,103
  180 VDU23,231,0,6,15,31,62,6,42,124
  190 VDU23,232,124,60,24,28,62,34,42
,107
  200 VDU23,233,123,122,30,30,12,12,0
,28
  210 VDU23,234,124,60,24,28,28,54,11
8,237
  220 VDU23,235,223,60,92,108,110,101
,3,230
  230 VDU23,236,124,60,24,28,62,110,1
18,182
  240 VDU23,237,215,59,116,108,110,10
1,3,230
  250 VDU23,238,96,240,248,124,64,45,
123,119
  260 VDU23,239,46,14,60,60,60,124,12
4,124
  270 VDU23,240,60,28,28,14,14,12,3,6
  280 VDU23,241,6,15,31,62,2,180,222,
238
  290 VDU23,242,116,112,60,60,60,62,6
2,62
  300 VDU23,243,60,56,56,112,112,48,1
92,96
  310 VDU23,244,224,0,224,64,64,64,64
,224
  320 VDU23,245,255,126,231,195,102,3
6,102,195
  330 VDU23,246,24,60,102,94,126,126,
60,24
  340 VDU23,247,0,60,118,251,251,126,
60,0
  350 VDU23,248,0,60,126,255,251,102,
60,0
  360 VDU23,249,24,60,126,94,94,110,6
0,24
  370 VDU23,250,153,255,90,126,60,24,
29,15
  380 VDU23,251,0,255,255,255,255,255
,255,0
  390 VDU23,252,60,255,90,126,60,24,1
84,240
  400 ENVELOPE1,1,5,0,0,25,0,0,126,0,
0,-126,126,126
  410 ENVELOPE2,1,0,0,0,0,0,0,126,-1,
0,-3,126,126
  420 ENVELOPE3,2,-40,50,-20,-10,5,2,
127,-3,-2,-1,126,0
  430 ENVELOPE4,1,1,1,1,5,5,5,-5,-1,-
1,-1,120,120
  440 ENVELOPE5,2,1,-1,1,2,4,2,1,0,0,
-1,126,126
  450 ENVELOPE6,3,-1,0,0,150,0,0,10,0
,0,-10,126,126
  460 ENVELOPE7,130,0,-2,0,8,25,20,0,
-4,-4,-3,120,120
  470 ENVELOPE8,2,0,0,0,0,0,255,3,0,0
,-126,80,20
  480 ENVELOPE9,1,1,0,0,0,0,0,0,-20,-
40,-60,126,100
  490 ENVELOPE10,1,0,0,0,1,1,1,-2,-2,
-2,-2,100,20
  500 *FX138,0,68
  510 *FX138,0,69
  520 *FX138,0,76
  530 *FX138,0,46
  540 *FX138,0,48
  550 *FX138,0,44
  560 *FX138,0,54
  570 *FX138,0,53
  580 *FX138,0,48
  590 *FX138,0,13
  600 *FX138,0,82
  610 *FX138,0,85
  620 *FX138,0,78
  630 *FX138,0,13
  640 END
  650 ON ERROR MODE7:PRINT"ERROR AT L
INE ";ERL:END
  660 PROCd:REPEAT:MODE2:VDU23;8202;0
;0;0;:PROCi:SC%=1:SO=0:FORLI%=2TO0STE
P-1:PROCm:REPEAT:A=130:IFINKEY-98PROC
l:A=0
  670 IFINKEY-67PROCr:A=0
  680 IFINKEY-1PROCj:A=0
  690 IFINKEY-17 THEN *FX210,1
  700 IFINKEY-82 THEN *FX210,0
  710 PROCg:IF POINT(X%,Y%-96)=0 AND
POINT(X%+56,Y%-96)=0 PROCf
  720 FORP=0TOA:NEXT:UNTIL LIFE<>0
  730 IFLIFE=2PROCn ELSEPROCo
  740 NEXT:UNTIL FALSE
  750 DEFPROCd:SO=0:DIMB(4),M$(11),C(
9),S$(4)
  760 FORA=1TO4:B(A)=A+245:NEXT:FORA=
0TO11:READB,C,D:M$(A)=CHR$B+CHR$8+CHR
$10+CHR$C+CHR$8+CHR$10+CHR$D:NEXT:FOR
P=1TO9:READC(P):NEXT:D$="GAME OVER":F
ORP=1TO4:READ S$(P):NEXT
  770 DATA224,225,226,224,227,228,224
,225,226,224,229,230,231,232,233,231,
234,235,231,232,233,231,236,237,238,2
39,243,241,242,240,241,242,243,238,23
9,240,1,2,5,4,6,8,9,12,13
  780 DATA"Ye Cumbersome cellar","The
 Loitering Lounge"," Boisterous Bedro
om"," The Authentic Attic"
  790 *TV255
  800 ENDPROC
  810 DEFPROCm:IF SC%/2=INT(SC%/2) VD
U23,250,60,127,174,126,76,60,28,14,23
,252,60,254,117,126,50,60,56,112 ELSE
 VDU23,250,40,108,254,174,254,140,89,
62,23,252,20,54,127,117,127,49,154,12
4
  820 FORP=1TO15:VDU19,P,0;0;:NEXT:VD
U4,17,128,12:COLOUR135:COLOUR4:PRINTT
AB(3,1);CHR$251;CHR$251;CHR$251;:COLO
UR6:PRINT;STRING$(11,CHR$251)
  830 COLOUR0:PRINTTAB(16,1);CHR$251:
COLOUR128:GCOL0,7:MOVE312-128,960:DRA
W312-128,988:MOVE1216-128,960:DRAW121
6-128,988
  840 RESTORE(930+SC%*30):ON SC%GOSUB
 980,1010,1040,1070
  850 READPLAT%:LP%=0:COLOUR9:READ N%
:FORZ%=1 TO N%:READ X,Y,N:PRINTTAB(X,
Y);STRING$(N,CHR$254):NEXT:COLOUR134:
COLOUR4:VDU23,254,255,193,131,226,50,
30,8,255
  860 PRINTTAB(0,3);STRING$(20,CHR$25
4);TAB(0,28);STRING$(20,CHR$254):VDU2
3,254,143,139,153,177,225,225,189,135
  870 PRINTTAB(0,3);STRING$(25,CHR$25
4+CHR$8+CHR$10);TAB(19,4);STRING$(25,
CHR$254+CHR$8+CHR$10)::COLOUR128:COLO
UR3:PRINTTAB(7,30);"SCORE: ";SO:VDU5:R
```

```
EADN%:FORZ%=1TON%:READX,Y:MOVEX*64,10
20-Y*32
 880 GCOL204,1:VDU253:IF POINT(X*64,
988-Y*32)<>0VDU8,10:GCOL3,8:VDU255
 890 NEXT:GCOL204,1:MOVE192,1020:PRI
NT"STRENGTHOMETER":GCOL231,1:MOVE0,95
6:PRINTS$(SC%):GCOL3,2:READ A%,B%,D%,
E%:IF A%<>0 C%=A%:MOVEA%,B%:VDU244
 900 GCOL3,5:READF%,G%,J%,H%:IF F%<>
0 I%=G%:K%=1:T%=1:MOVEF%,G%:VDUB(K%)
 910 READL%,M%,V%,W%:IF L%<>0 U%=L%:
GCOL3,1:MOVEL%,M%:VDU245
 920 GCOL0,8:MOVE64,156:PRINTSTRING$
(18,CHR$255)
 930 SOUND2,8,53,60:SOUND3,8,53,60:V
DU23,0,1,1;0;0;0;:FORP=1TO9:READA:VDU
19,C(P),A;0;:NEXT:VDU19,10,3;0;19,11,
3;0;19,3,3;0;19,14,7;0;19,15,7;0;19,7
,7;0;:FORF=1.1TO81STEP.1:VDU23,0,1,F;
0;0;0;:NEXT
 940 Y$=CHR$224:GCOL3,3:R%=1:X%=256:
Y%=892:VDU24,X%;Y%-92;X%+64;Y%;:Y%=88
8-28:MOVEX%,Y%:VDU224:FORP=1TO14:MOVE
X%,Y%:PRINTY$:Y%=Y%+8:IF P=7 Y$=Y$+CH
R$8+CHR$10+CHR$227 ELSEIF P=11 Y$=Y$+
CHR$8+CHR$10+CHR$228
 950 SOUND3,3,P*4+53,2:SOUND2,1,P*4+
53,2:MOVEX%,Y%:PRINTY$:FORL=1TO99:NEX
T,:VDU26:MOVE0,96:PRINTSTRING$(LI%,M$
(8)+CHR$11+CHR$11+CHR$9):O%=1000:P%=2
48:Q%=1:Z=0:GCOL3,7:MOVEO%,P%:VDU252:
TI%=1024:LIFE=0:ENDPROC
 960 DATA58,23,8,15,2,1,7,4,1,8,5,1,
9,15,14,8,1,15,10,2,16,11,2,17,12,2,1
7,13,2,16,14,2,13,15,4,3,15,3,1,15,1,
2,17,1,1,19,1,1,20,2,1,21,3,16,21,3,1
8,22,1,17,24,2,16,25,1,15,26,1,1,27,1
8,6,5,20,4,26,8,26,12,26,14,14,10,8
 970 DATA256,348,1024,24,512,892,764
,-8,0,0,0,0,3,6,5,4,6,7,1,6,2
 980 VDU23,253,153,153,153,219,90,90
,126,255,23,254,255,0,255,111,38,34,2
,32,23,255,0,255,0,144,218,93,53,0:RE
TURN
 990 DATA48,25,1,7,4,16,7,3,1,9,1,1,
10,1,4,10,4,8,12,3,12,9,3,1,15,1,10,1
5,9,4,16,1,2,18,5,10,18,4,1,20,1,1,21
,2,12,21,3,12,22,1,12,23,1,12,24,1,12
,25,1,9,26,5,18,21,1,18,23,1,18,25,1,
1,27,18,7,21,1,14,13,6,7,9,8,11,9,11,
11,14,14,14
 1000 DATA1,14,4,17,9,20,14,20,18,20,
13,25,8,26,16,26,1000,796,304,-24,256
,680,536,-8,192,348,696,24,6,4,7,1,5,
3,2,7,3
 1010 VDU23,253,66,102,36,102,102,60,
24,255,23,254,255,204,127,45,37,108,1
2,0,23,255,0,51,128,210,218,147,242,3
0:RETURN
```

```
 1020 DATA53,25,1,7,4,17,7,2,1,9,2,3,
11,2,8,11,2,13,11,1,18,14,1,9,14,1,3,
17,2,8,17,2,11,17,1,11,18,2,11,19,3,1
1,20,8,1,21,2,3,23,2,8,23,2,11,22,8,1
1,23,3,11,24,2,11,25,1,17,24,2,16,25,
2,15,26,2,1,27,18,9,1,8,9,16,11,16
 1030 DATA17,19,9,22,4,26,8,26,12,26,
1,20,1064,796,320,-24,384,672,224,-32
,1056,572,672,-16,1,3,5,7,2,6,4,5,3
 1040 VDU23,253,153,153,153,219,60,24
,90,255,23,254,255,170,53,94,132,66,0
,0,23,255,0,85,202,161,105,173,165,0:
RETURN
 1050 DATA53,24,1,9,16,8,7,2,11,7,2,7
,8,3,11,8,3,17,10,1,16,11,1,15,12,1,1
4,13,1,13,14,1,8,12,2,3,12,2,2,13,1,1
,15,2,3,18,2,1,21,2,6,21,2,11,21,2,16
,21,3,8,23,3,13,23,1,15,24,1,14,25,1,
1,27,18,16,16,14,9,14,10,22,8,22,2,26
,3,26,4,26
 1060 DATA5,26,6,26,8,26,9,26,10,26,1
3,26,14,26,16,26,17,26,192,540,888,24
,640,888,760,-8,64,220,1152,16,4,1,6,
2,3,7,5,2,6
 1070 VDU23,253,66,102,36,255,153,255
,66,102,23,254,255,170,85,255,86,210,
150,176,23,255,0,85,170,0,169,45,105,
79:RETURN
 1080 DEFPROCl:SOUND0,2,3,1:IFPOINT(X
%-8,Y%-92)=4 FORP=1TO99:NEXT:ENDPROC
 1090 r%=R%:x%=X%:X%=X%-16:IFX%<=O%+5
6 AND X%>=O%-56 AND Y%>=P%-32 AND Y%<
=P%+96 OR POINT(X%,Y%-92)>11 PROCstr
 1100 R%=R%+1:IFR%>7 OR R%<4 R%=4
 1110 PROCh:GCOL3,3:MOVEx%,Y%:PRINTM$
(r%):MOVEX%,Y%:PRINTM$(R%):ENDPROC
 1120 DEFPROCr:SOUND0,2,3,1:IFPOINT(X
%+64,Y%-92)=4 FORP=1TO99:NEXT:ENDPROC
 1130 r%=R%:x%=X%:X%=X%+16:IFX%<=O%+5
6 AND X%>=O%-56 AND Y%>=P%-32 AND Y%<
=P%+96 OR POINT(X%+56,Y%-92)>11 PROCs
tr
 1140 R%=R%+1:IFR%>3 R%=0
 1150 PROCh:GCOL3,3:MOVEx%,Y%:PRINTM$
(r%):MOVEX%,Y%:PRINTM$(R%):ENDPROC
 1160 DEFPROCh IF X%/64<>INT(X%/64) E
NDPROC
 1170 IF POINT(X%,Y%-96)<>9 ENDPROC E
LSE IF POINT(X%+24,Y%-100)=0 GCOL3,8:
VDU25,4,X%;Y%-96;255:SOUND0,2,6,1:LP%
=LP%+1:SO=SO+2:VDU4,17,3,31,13,30:PRI
NT;SO:VDU5:IF LP%=PLAT% LIFE=2
 1180 ENDPROC
 1190 DEFPROCf:U=1:SOUND2,6,Y%/10,99:
REPEAT:y%=Y%:Y%=Y%-16:U=U+1:GCOL3,3:F
ORP=1TO20:NEXT:MOVEX%,y%:PRINTM$(R%).
MOVEX%,Y%:PRINTM$(R%):PROCg:IF U>11 P
ROCstr
 1200 UNTIL POINT(X%+56,Y%-96)<>0 OR
POINT(X%,Y%-96)<>0
 1210 SOUND&12,0,0,0:IF POINT(X%,Y%-9
2)>11 OR POINT(X%+56,Y%-92)>11 OR POI
NT(X%,Y%-96)>11 OR POINT(X%+56,Y%-96)
>11 PROCstr
 1220 PROCh:ENDPROC
 1230 DEFPROCj:SOUND2,4,Y%/9,1:S=R%:V
=0:IFINKEY-67W=64:R=8:RESTORE1340ELSE
IFINKEY-98W=-8:R=9:RESTORE1350ELSEW=3
2:R=R%:RESTORE1360
 1240 REPEAT:x%=X%:y%=Y%:READX,Y:IFX=
0ANDY=0 V=2:GOTO1310
```

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```
 1250 IFPOINT(X%+W,Y%-96)<>4 X%=X%+X
 1260 IFPOINT(X%+32,Y%+4)<>4 Y%=Y%+Y
 1270 IFPOINT(X%+56,Y%-92)>11 OR POIN
T(X%,Y%-92)>11 OR X%<=O%+48 AND X%>=O
%-56 AND Y%>=P%-28 AND Y%<=P%+96 PROC
str
 1280 IFY<0 AND R=8 R=11 ELSEIF Y<0 A
NDR=9 R=10
 1290 IFY<0 AND POINT(X%,Y%-96)<10 AN
D POINT(X%,Y%-96)>0 OR Y<0 AND POINT(
X%+56,Y%-96)<10 AND POINT(X%+56,Y%-96
)>0 V=1
 1300 GCOL3,3:MOVEx%,y%:PRINTM$(R%):R
%=R:MOVEX%,Y%:PRINTM$(R)
 1310 PROCg:UNTIL V<>0 OR LIFE=1
 1320 IF V=2 PROCf
 1330 PROCh:GCOL3,3:MOVEX%,Y%:PRINTM$
(R):MOVEX%,Y%:PRINTM$(S):R%=S:ENDPROC
 1340 DATA16,16,16,16,16,16,16,16,16,
16,16,-16,16,-16,16,-16,16,-16,16,-16
,0,0
 1350 DATA-16,16,-16,16,-16,16,-16,16
,-16,16,-16,-16,-16,-16,-16,-16,-16,-
16,-16,-16,0,0
 1360 DATA0,16,0,16,0,16,0,16,0,16,0,
-16,0,-16,0,-16,0,-16,0,-16,0,0
 1370
 1380 DEFPROCg:ON SC% GOSUB 1390,1400
,1410,1420:PROCt:ENDPROC
 1390 IFY%<736 PROCx:RETURN ELSE PROC
z:RETURN
 1400 IFY%>736 PROCx:RETURN ELSEIF Y%
>528 PROCz:RETURN ELSE PROCy:RETURN
 1410 IFY%>764 PROCx:RETURN ELSEIF Y%
>640 AND X%>400 PROCy:RETURN ELSEIFX%
<576 PROCz:RETURN ELSE RETURN
 1420 IFY%>764 PROCz:RETURN ELSEIFY%<
448 PROCy:RETURN ELSE PROCx:RETURN
 1430 DEFPROCt:Z=Z+1:IFZ<15 ENDPROC
 1440 PROCtim:Z=0:o%=O%:p%=P%:q%=Q%
 1450 IF P%>Y% P%=P%-8 ELSEIF P%<Y% P
%=P%+8
 1460 IF O%>X% O%=O%-8 ELSEIF O%<X% O
%=O%+8
 1470 Q%=-Q%:IFX%<=O%+48 AND X%>=O%-5
6 AND Y%>=P%-28 AND Y%<=P%+96 PROCstr
 1480 GCOL3,7:MOVEo%,p%:VDU251+q%:MOV
EO%,P%:VDU251+Q%:ENDPROC
 1490 DEFPROCx:A%=A%+E%:IFA%=C% OR A%
=D% E%=-E%:SOUND3,5,RND(40)+20,30:END
PROC
 1500 VDU18,3,2,25,4,A%;B%;244:ENDPRO
C
 1510 DEFPROCz:f%=F%:g%=G%:k%=K%:G%=G
%+H%:IF G%=I% OR G%=J% H%=-H%:T%=-T%:
SOUND3,7,T%*99,20
 1520 K%=K%+T%:IF K%=5 K%=1 ELSEIF K%
```

```
=0 K%=4
 1530 VDU18,3,5,25,4,f%;g%;B(k%);25,4
,F%;G%;B(K%)
 1540 IFX%<=F%+48 AND X%>=F%-48 AND Y
%>=G%-28 AND Y%<=G%+96 PROCstr:PROCst
r
 1550 ENDPROC
 1560 DEFPROCy:l%=L%:m%=M%:GCOL3,1:L%
=L%+W%:IF L%=U% OR L%=V% W%=-W%:SOUND
3,5,RND(40)+50,30
 1570 VDU25,4,l%;m%;245,25,4,L%;M%;24
5:ENDPROC
 1580 DEFPROCn:GCOL0,0:VDU4:FOR P=TI%
TO192STEP-8:SO=SO+5:MOVEP,984:DRAWP,9
64:VDU17,2,31,13,30:PRINT;SO:NEXT:SC%
=SC%+1:LI%=LI%+1:IF SC%=5 SC%=1
 1590 VDU4,17,128,31,0,31:SOUND0,8,4,
14:FORQ=0TO31:VDU10:*FX19
 1600 NEXT:ENDPROC
 1610 DEFPROCtim:GCOL0,0:TI%=TI%-8:IF
 TI%<=192 LIFE=1:MOVE192,988:VDU251:E
NDPROC
 1620 MOVETI%,984:DRAWTI%,964:ENDPROC
 1630 DEFPROCstr:SOUND0,1,1,2:TI%=TI%
-48:GCOL0,0:IF TI%<=192 LIFE=1:MOVE19
2,988:VDU251:ENDPROC
 1640 MOVETI%,988:VDU251:IF SO>10 SO=
SO-5:VDU4,17,3,31,13,30:PRINT;SO;"  "
:VDU5
 1650 ENDPROC
 1660 DEFPROCo:Y$=M$(R%):GCOL3,3:VDU2
4,X%;Y%-92;X%+64;Y%;:FORP=1TO12:SOUND
2,4,12-P,1:MOVEX%,Y%:PRINTY$:Y%=Y%-8:
IF P=4 Y$=LEFT$(Y$,4) ELSE IF P=8 Y$=
LEFT$(Y$,1)
 1670 MOVEX%,Y%:PRINTY$:FORL=1TO99:NE
XT,:VDU26,25,4,X%;Y%+32;18,0,7,23,254
,8,56,30,16,16,16,122,255,9,127,254:F
ORF=1TO2000:NEXT:VDU4,26,17,128
 1680 IF LI%=0 FORP=0TO8:SOUND2,7,P+9
9,5:COLOURP/2+2:A$=MID$(D$,P+1,1):PRI
NTTAB(P*2+2,14);A$:FORL=1TO600:NEXT,
 1690 SOUND2,8,4,20:SOUND3,8,4,20:FOR
F=81TO0STEP-.3:VDU23,0,1,F;0;0;0;:NEX
T:ENDPROC
 1700 DEFPROCi:VDU19,1,0;0;:GCOL0,129
:FORP=160TO1064 STEP192:VDU24,P;544;P
+160;760;:CLG:NEXT:VDU26:GCOL0,0:FORP
=&D01TO&D96STEP6:A=?P:B=?(P+1):C=?(P+
2):D=?(P+3):E=?(P+4):F=?(P+5):MOVEA*8
,B*8:DRAWC*8,D*8:PLOT85,E*8,F*8:NEXT
 1710 VDU19,1,1;0;:GCOL0,3:MOVE256,76
0:DRAW1088,576:PLOT85,1056,544:GCOL0,
128
 1720 VDU5:GCOL0,7:MOVE544,960:PRINT"
The":GCOL0,6:MOVE552,964:PRINT"The":G
COL0,6:MOVE320,860:PRINT"Ghouls of":G
COL0,4:MOVE328,864:PRINT"Ghouls of":G
COL142,1:MOVE576,440:PRINT"By":GCOL13
8,1:MOVE256,384:PRINT"P. Azzopardi"
 1730 MOVE192,160:GCOL146,1:PRINT"Spa
ce to start":VDU4:S$="--SCORE:"+STRIN
G$(4-LEN(STR$(SO)),"0")+STR$(SO)+"--"
:FORP=1TO14:COLOURP:IFP<8 COLOUR15-P
 1740 PRINTTAB(P+2,24);MID$(S$,P,1):N
EXT:COLOUR3:PRINTTAB(2,18);M$(8);TAB(
17,18);M$(9):F=7:FORP=0TO19:COLOURF+7
:PRINTTAB(P,0);"0";TAB(19-P,30);"0";:
F=F+1:IF F>7F=1
 1750 NEXT:F=6:FORP=1TO29:COLOURF+7:P
RINTTAB(0,P);"0";TAB(19,30-P);"0";:F=
F-1:IF F<1F=7
 1760 NEXT:Q$="1234567":REPEAT:S$=RIG
HT$(Q$,6)+LEFT$(Q$,1):Q$=S$:FORP=1TO7
:Q=VAL(MID$(Q$,P,1)):VDU19,P+7,Q;0;:N
EXT:UNTIL INKEY-99:ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 143.

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MINI OFFICE 2	16.95	14.95
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Inside the Canon for a quid...

WITH reference to Mike Yorke's letter in Micromail, February 1986, regarding the old £ and # problem on the Canon 1080A printer. I agree that the only answer is to modify the printer firmware.

The # character is no problem since the USA character set can be used as the default setting. This leaves the £ which the BBC Micro defines as Ascii 96 and the Canon as Ascii 6.

The printer's Ascii 96 accent character is rarely used so the answer is to swap the definitions of these two characters within the Canon. This is quite simple once you know which ROM does what and how many bytes are assigned to each character.

The standard font is contained within ROM IC4. The standard NLQ and the alternate italic font are both contained in ROM IC2.

The socket for IC3, which is normally empty, would contain either an optional NLQ font eprom, typically italic, or a 6264 RAM for use with downloadable NLQ fonts.

The characters we are interested in reside at the following locations within these ROMs:

- *IC2 – Standard NLQ font*

The definition of a £ (Ascii 6) is 48 bytes long, starts at &0120, finishes at &014F and is:

```
02 16 00 00 00 00 00 00 00
00 02 04 10 00 04 02 10 00
04 02 38 38 06 44 10 00 40
04 10 00 42 00 00 02 40 00
20 42 02 00 20 44 00 00 00
00 00 00
```

The definition of an accent (Ascii 96) is 48 bytes long, starts at &1200, finishes at &122F and is:

```
86 11 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00
80 00 00 00 80 00 00 80 00
00 00 80 40 00 00 00 00 00
00 00 00 00 00 00 00 00 00
00 00 00
```

- *IC2 – Alternate (Italic) font*

The definition of a £ (Ascii 6) is 12 bytes long, starts at &1A48, finishes at &1A53 and is:

```
8A 12 04 3A 40 12 80 02 84
00 00 00
```

The definition of an accent (Ascii 96) is 12 bytes long, starts at &1E80, finishes at &1E8B and is:

```
C9 00 00 00 00 80 00 40 00
00 00 00
```

- *IC3 – Optional NLQ font*

The characters should occupy the same addresses as those in the standard NLQ font but will obviously contain different code. I do not possess this font ROM so I cannot give the code for this.

- *IC4 – Standard font*

The definition of a £ (Ascii 6) is 12 bytes long, starts at &0048, finishes at &0053 and is:

```
8B 11 00 7F 80 11 80 01 80
41 00 00
```

The definition of an accent (Ascii 96) is 12 bytes long, starts at &0480, finishes at &048B and is:

```
B8 00 00 00 80 00 40 00 00
00 00 00
```

Just edit the eprom code to swap the Ascii 6 and Ascii 96 definitions in each of the above fonts, although I suggest you keep the original eproms and blow the modified code into fresh 2764-250 eproms just in case of disasters.

Before refitting the printer top, reset the DIP switches SW1-1 through to SW1-4 to off, which sets the USA character as default.

The printer will now print the # and £ correctly in all modes.

Incidentally, whichever mode is used the accent character can still be printed out using the printer control codes:

```
VDU2,1,27,1,73,1,1,1,6,1,27
,1,73,1,0,3
```

or from within Wordwise:

```
OC27,73,1,6,27,73,0
```

– **Dave Binnington, Clacton-on-Sea.**

Bug in descenders

I FOUND Geoffrey W. Brown's routine to convert variable names to lower case in January's Micromail very useful but it does have one bug.

If a line ends in a hexadecimal constant the routine misses the end of line (&0D) byte.

This is not a problem under most circumstances as the program recovers itself when it finds the next end of line byte.

However Murphy occasionally strikes – if a program has very long lines ending in successive hex constants the program hangs up. It is easily cured by adding two lines of code:

```
841 CMP #&0D
```

and:

```
842 BEQ newline
```

I am trying to modify this program to cope with assembly language which it currently does not.

Finally, now that Acorn seem to be moving away from the idea of second processors for the home market is there any chance of us seeing a price drop for 6502 second processors? – **D.H. Lockwood, BFPO.**

- The second processors may well come down in price as a result of the launch of the Master series.

Radio link-up

I AM writing on behalf of AMRAC, Amateur Radio And Computers, which serves licenced radio amateurs keen to exploit the use of computers with two way radio in the Hampshire, Sussex and Wiltshire areas.

We have 62 members of which about 40 are BBC Micro owners, the rest owning CBM64, Spectrum and IBM PC machines.

Most of our members live in the South of England but we do have a couple of members in the North and are keen to promote the formation of similar groups throughout the UK.

We have developed a range of good quality free software to members for amateur radio applications such as Prestel-style mailbox emulation over radio and Ceefax style teletext retrieval and so on.

We meet once a month at the Crown Inn, Bishops Waltham, near Southampton and supplement out meetings with a regular newsletter.

Membership enquiries should be addressed to Tony Trigell G1JAF, Gleness, East Boldre, Brockenhurst, Hants SO42 7WD. (Tel: 0590 612130). – **Philip Bridges, Blackfield, Southampton.**

Help for Harriers

THIS is the first of a series of hints and tips we are releasing for those frustrated Harrier pilots who are as yet unable to locate and destroy the enemy HQ.

To survive for any length of time you must look after your landing sites. The rules are simple, but easy to forget if you have three MiGs on your tail.

If a tank moves on to a landing site the site is destroyed. If you are using sound, you will hear an explosion. A new landing site then becomes available at Home Base, where Q landing site starts off.

If a tank moves on to Home Base the game will end and the red screen appears.

Have you noticed that the red screen is maintained until you play dead by taking your fingers off the keyboard?

So if you hear explosions or get the red screen when everything seemed to be under control, you have probably forgotten your landing site.

You are particularly vulnerable when a landing site is destroyed and you get a new one

→

From Page 123

at Home Base, because tanks are targetted towards landing sites.

With a landing site on Home Base, your Achilles heel is exposed. Two tips:

- *As soon as you're airborne, go and destroy the four tanks to the east of landing site Q.*
- *Move your landing sites every 15 minutes or so.* – **Mirrorsoft Harrier Hot Line, 01-377 4837.**

Interested party

THE comments made by Kenneth Knight in the February Micromail on the calculation of building society interest were less than helpful.

A rate of interest of, for example, 8 per cent pa paid in two instalments on January 31 and July 31 means that £100 held six months to July 31 would allow £4 to be withdrawn then leaving £100 to earn the further £4 in the rest of the accounting year to January 31.

If the first £4 interest was left invested the principal for the second six monthly period would be £104 and the next interest credited would be £4.16.

The true annual rate of interest, compounded daily, is 8.16 per cent.

*Interest is earned on a daily basis, the effective rate being (m–1)*100 per cent per day where the daily multiplier, m, is given by m=(1 + (annual rate paid twice year)/(2*100))^(2/365)=1.0002149. Notice that 1.0002149^365 = 1.081600 and so on.*

The building of a Basic program for such calculations is not difficult once the task is correctly understood.

I have such a program, extensible to other accounts and to disc filing, which is helpful in many financial judgements. – **Alan Clark, Stafford.**

Citadel breached

I THOUGHT your readers would be interested to know of a small bug in Superior Software's latest release, Citadel.

Take one of the trampolines across the island to the right-most room (location 18:0, the ocean).

Jump on the trampoline three times. On the third jump move left until you go off screen then immediately move right to return to the trampoline.

Eventually enough height can be obtained to reach the room above the ocean, which is the title screen.

Although nothing useful can be achieved here you can jump off to the right and will fall back to the top of castle, though the coordinates will be incorrect. – **M.M. Young, Worthing, Sussex.**

Solidisk policy

READERS may be aware of a number of complaints recently upheld against Solidisk by the Advertising Standards Authority.

We would like to take the opportunity of giving our reply, and trust that it will raise points which may not yet have been taken into consideration.

The majority of complaints currently being raised are based on occasional discrepancies between the specification of the product received and the technical description made in the advertisement.

What complainants may not realise is that the "discrepancy" invariably amounts to an improvement in specification.

As everyone knows, specifications in the field of computing change extremely rapidly. The customer usually bears the cost if he wishes to acquire updated products.

Solidisk's policy is quite different – improvements in products are usually offered on a simple exchange basis and at no charge, and our range of free software is currently unequalled.

We therefore feel that some licence to change specifications for improvement should be given to us without being constantly penalised because they no longer conform strictly to the description within the advertisement.

If customers wish us to abide strictly by the regulations laid down by the ASA we shall be happy to provide them with the lower specification products as advertised!

We would then be obliged, however, to charge for the updating service.

On a happier note, out of some 1500 to 2000 new customers entering our books each month fewer than three complaints are upheld. Readers can draw their own conclusions. – **Hatti Perry, director, Solidisk.**

Cover appeal

I AM writing to you with some commendation, criticism and suggestion for your magazine.

First of all I would like to mention your front covers, which never seem to get much publicity. One of the things I look for in a magazine is its presentation, and yours seems to have an endless supply of appealing covers.

The last two, Elite and The Master Series have been the best so far, and I am looking forward to seeing the next cover.

It is obvious that other magazines think that they are so

When a bald patch isn't

THE answer to Colin Johnson's letter in the December 1985 Micro User *concerning PLOT21 is very simple. The bald patch is not bald – it is full of lines.*

The problem is that the area around it is white because the lines are drawn at different angles.

The computer keeps drawing dotted lines, but the dots fill in the "holes" created by previous dotted lines. Therefore the dotted effect disappears. An added snag is that this only occurs when lines are drawn at certain angles. The program (right) demonstrates this.

It draws a series of dotted lines, and overlays lines over these. This results in, among other things, the attractive check pattern in the bottom right-hand corner.

However the main point of the program is that as areas become filled with solid colour the areas with dotted colour appear to vanish so the problem is an optical illusion.

To prove the point, the program runs in Mode 2 and Mode 4, and the lines certainly do not disappear. So the problem is that the original program ran in Mode 0, thus creating the illusion problem because the dots are very small and do not show up well.

But things still aren't that simple. The BBC Micro has two dotted lines – well, it doesn't actually, it just appears to.

At certain angles the dotted effect forms horizontally parallel lines, while at other angles it forms vertically parallel lines.

Thus, if a horizontal dotted pattern crosses a vertical dotted pattern, the dotted effect becomes solid. This is best shown when the program runs in Mode 2.

I hope this solves the problem. Finally, another odd effect can occur when using a TV – if you draw dotted lines in Mode 0 in white they appear to be blue because of the TV colour crawl. – **Jeremy Bullock, Shropshire.**

```
   10 REM PLOT 21 Demonstra
tion.
   20 FOR mode=0 TO 4 STEP
2
   30 MODE mode
   40 FOR A%=0 TO 1279 STEP
 4
   50 MOVE 0,0
   60 PLOT 21,1280,A%
   70 IF A%>500 MOVE A%,0:P
LOT 21,1280,A%+500
   80 NEXT
   90 FOR A%=500 TO 1000 ST
EP 4
  100 MOVE A%,1024:PLOT 21,
A%,500
  110 MOVE 0,A%:PLOT 21,500
,A%
  120 MOVE 0,A%-500:PLOT 5,
500,A%-500
  130 NEXT
  140 KEY=GET:NEXT
```

SAYING IT SIDEWAYS

HAVING nothing to do on the bus to work one morning I decided to write a potentially useful program which would convert a given input message to a large letter sideways printout with each individual letter of the message appearing on a separate sheet.

Having successfully done so I wonder if it would be of any use to your readers. – **Michael J. Weight, Camberley.**

```
 10 CLS
 20 INPUT "WHAT IS THE MESSAGE  "M$
 30 VDU 2
 40 FOR L=1 TO LEN(M$)
 50 C$=(MID$(M$,L,1))
 60 C=ASC(C$)
 70 C=C-32
 80 A=(8*C)+&C000
 90 MASK=128
100 FOR BIT=1 TO 8:P$=""
110 FOR BYTE=A+7 TO A STEP-1
120 D=MASK AND ?BYTE
130 IF D=0 THEN P$=P$+"          "
ELSE P$=P$+"*** ******": REM TEN SPAC
ES
140 NEXT BYTE
150 FOR P=1 TO 8:PRINT P$:NEXT P
160 MASK = MASK/2
170 NEXT BIT
180 NEXT L
190 VDU 3
```

superior that they can get away with unappealing and often hideous covers.

My second point concerns internal layout. The contents page is well set out, and always easy to read unlike other magazines.

Also regulars like Micromail are always in the same place, and so easy to find without the contents page.

Your endless Body Building Course is always fascinating, and I find that it makes a good read even without embarking on the practical side.

As you can see, on the whole, I am thoroughly satisfied with the magazine. Keep it up. – **Michael Spalter, London NW7.**

- We are grateful for the praise as we are proud of the overall appearance of the magazine. Once the content is balanced and correct a great deal of extra time and effort goes into producing the cover and it's nice to know that these efforts are not wasted.

Good guide

I WRITE to express my thanks for the Guide to playing Elite.

It has opened up a game which my eldest son and I had reluctantly given up as we couldn't progress.

In three days we have gone from nowhere to Dangerous.

Elite is the ideal computer game as it combines adventure, strategy and arcade action in one program. – **M. Crowther, Kidlington, Oxon.**

AND SAYING IT BIG

IN the February issue of Micromail P. Sargent of Sheffield wanted to mix single and double height letters on one line.

It can't be done in teletext as you pointed out, but there are several large letter routines around in the graphics modes.

Here is an assembler routine to do what is required.

The machine code, only 80 bytes plus the buffer, takes each letter in turn (lines 210 to 290) and explodes it into its individual bytes using OSWORD with A=10 (lines 310 to 350).

The top half of the letter is spread over a whole user defined character and printed, likewise the bottom half (lines 390-560).

The function FNd places the required string in the buffer and calls the double height routine. It then returns the value 0 so that the CHR$ to be printed does nothing.

I chose this way of constructing the print line so that it would be easy to handle. Don't forget the extra line print symbol ' at the start of line 40.

If there is room in the main program you can leave the assembler in, using:

```
DIM double 120
```

before assembly, and changing line 120 to:

```
P%=double
```

otherwise assemble it:

```
*SAVE DOUBLE 900 950
```

or whatever assembly area you use and make a note of the two variables buf *and* double *which will be required in the main program.*

```
*LOAD DOUBLE
```

with your main program, making sure you leave a whole line for the buffer which will require up to 40 bytes.

The character address chr *has been calculated to use the area of memory reserved for user defined character 255. To use a different character amend line 100 accordingly.* – **Peter Vasey, South Shields.**

```
   10 PROCassemble
   20 MODE 4
   30 FOR A%=1 TO 15
   40 PRINT 'TAB(10)" THE "
CHR$FNd("MICRO")" USER"
   50 NEXT:END
   60 DEF FNd($buf)
   70 CALL double
   80 =0
   90 DEF PROCassemble
  100 oswrch=&FFEE:chr=&500
+8*255
  110 FOR N%=0 TO 2 STEP 2
  120 P%=&900
  130 [OPT N%
  140 .double
  150 LDA #buf MOD &100
  160 STA &70
  170 LDA #buf DIV &100
  180 STA &71
  190 LDY #0
  200 STY &73
  210 LDA (&70),Y
  220 .loop
  230 JSR db
  240 INC &73
  250 LDY &73
  260 LDA (&70),Y
  270 CMP #13
  280 BNE loop
  290 RTS
  300 .db
  310 STA &74
  320 LDA #10
  330 LDX #&74
  340 LDY #0
  350 JSR &FFF1
  360 LDA #11
  370 JSR oswrch
  380 LDX #0
  390 JSR define
  400 LDA #10
  410 JSR oswrch
  420 TYA
  430 JSR oswrch
  440 .define
  450 LDY #0
  460 .defloop
  470 LDA &75,X
  480 STA chr,Y
  490 STA chr+1,Y
  500 INX
  510 INY
  520 INY
  530 CPY #8
  540 BNE defloop
  550 LDA #(chr-&500) DIV 8
  560 JMP oswrch
  570 .buf:]
  580 NEXT
  590 ENDPROC
```

Loops routine

IN the February issue of The Micro User *you published a program by Robin Nixon showing how to implement WHILE-WEND loops in BBC Basic.*

Unfortunately, as the author points out, nested loops are not allowed and I found some problems when using these new loops with GOSUBs and PROCs.

With some modifications I wrote a new routine (Program I) which seems to work correctly and deals with up to 28 nested loops and reports three new error messages:

Error 45: too many WHILEs – when attempting to nest more than 28 WHILE-WEND loops.

Error 46: no WEND – when the WEND associated with a given WHILE has been searched for and not found.

Error 47: no WHILE – when a WEND has been found with no associated WHILE.

To keep the code as short as possible I cut out the automatic Basic I or II test, leaving it to the user.

The new routine uses the area &900-&AAB for storing the machine code and &AAC-&AFF as a stack recording WHILEs' positions in the Basic program.

Byte &80, in which the number of nested loops is kept, acts as a stack pointer.

*Before using WHILE-WEND loops in a program after the routine has been made active with *RUN WW, the stack must be cleared by typing ?&80=0. Program II is a demonstration of this utility in action.* – **B. Kokanosky, Amiens, France.**

Program I

```
   10 REM WHILE-WEND
   20 REM nested loops
   30 REM
   40 REM By Bernard Kokano
sky
   50 REM (c) The Micro Use
r
   60 REM
   70 PROCinit
   80 FOR PASS=0 TO 3
   90 PROCassemble
  100 NEXT
  110 PRINT'"Press SPACE to
save the object code";
  120 REPEAT UNTIL GET=32
  130 *SAVE WW 900 AAC
  140 PRINT''"The object co
de has been saved as WW"
  150 END
  160 DEF PROCassemble
  170 P%=&900
  180 [OPT PASS
  190 SEI:LDA &24B:STA &F4:
STA &FE30
  200 CLI:LDA &202:LDX &203
  210 CMP #start MOD &100:B
NE brkvector
  220 CPX #start DIV &100:B
EQ alreadych
  230 .brkvector
  240 STA &70:STX &71
  250 LDA #start MOD &100:S
TA &202
  260 LDA #start DIV &100:S
TA &203
  270 .alreadych
  280 RTS
  290 .start
  300 PHA:TYA:PHA:TXA:PHA
  310 LDY #0:LDA (&FD),Y
  320 CMP #4:BEQ mistake
  330 .notnewword
  340 PLA:TAX:PLA:TAY:PLA:J
MP (&70)
  350 .mistake
  360 LDA #newkeytable MOD
&100:STA &39
  370 LDA #newkeytable DIV
&100:STA &3A
  380 LDY &A:DEY:TYA:CLC:AD
C &B:STA &37
  390 LDA &C:ADC #0:STA &38
  400 JSR nextword
  410 BCS notnewword
  420 DEY:TYA:CLC:ADC &A:ST
A &A
  430 PLA:PLA:PLA:PLA:PLA:P
LA:PLA:PLA
  440 JMP (&37)
  450 .nextword
  460 LDY #0:LDA (&39),Y:BE
Q nomatch
  470 CMP (&37),Y:BNE diffe
rent
  480 .nextchar
  490 INY:LDA (&39),Y:BEQ g
etaddress
  500 CMP (&37),Y:BEQ nextc
har
  510 .different
  520 INY:LDA (&39),Y:BNE d
ifferent
  530 INY:INY:TYA:SEC:ADC &
39:STA &39
  540 LDA &3A:ADC #0:STA &3
A
  550 JMP nextword
  560 .getaddress
  570 INY:LDA (&39),Y:STA &
37:INY
  580 LDA (&39),Y:STA &38:D
EY:DEY
  590 CLC:RTS
  600 .nomatch
  610 SEC:RTS
  620 .while
  630 LDX &80:CPX #&1C:BCS
toowhiles
  640 LDA &A:STA &1B:STA &A
AC,X
  650 LDA &B:STA &19:STA &A
C8,X
  660 LDA &C:STA &1A:STA &A
E4,X
  670 INC &80
  680 .while1
  690 JSR evaluate:JSR inte
ger:LDA &2A
  700 ORA &2B:ORA &2C:ORA &
2D:BNE true
  710 LDA &1B:CLC:ADC &19:S
TA &B
  720 LDA &1A:ADC #0:STA &C
  730 LDA #0:STA &A
  740 .searchwend
  750 JSR findwend
  760 INC &A:LDA &80:BEQ no
while
  770 DEC &80:JMP quit
  780 .wend
  790 LDX &80:BEQ nowhile
  800 LDA &AAB,X:STA &1B
  810 LDA &AC7,X:STA &19
  820 LDA &AE3,X:STA &1A:JM
P while1
  830 .true
  840 LDA &1B:STA &A:LDA &1
9:STA &B
  850 LDA &1A:STA &C
  860 .quit
  870 JSR checkend:JMP cont
inue
  880 .newkeytable
  890 OPT FNequs("WHILE")
  900 OPT FNequb(0)
  910 OPT FNequw(while)
  920 OPT FNequs("WEND")
  930 OPT FNequb(0)
  940 OPT FNequw(wend)
  950 .toowhiles
  960 OPT FNequb(0)
  970 OPT FNequb(45)
  980 OPT FNequs("Too many
WHILEs")
```

Hiccups

MICHAEL Stallybrass's Basic Analyser program in the November 1985 issue of Micro User *has proved invaluable in checking typing errors before trying to run a program. There is, however, a discrepancy between the results displayed at the end of Part 1 and those in the summary of Part 2.*

This is because, although all lines are analysed, the results obtained from the last line are not added to the display in Part 1 but do appear in Part 2.

I have overcome this by adding line 265 which is basically a copy of line 350 with the first PRINT statement Tab(18,7);N% omitted. If this statement is left in then current line is shown as –1.

A semi-colon must be added after PRINTTAB(18,9) to get the spacing right.

Find and Replace (January 1986) has had a bit of a hiccup in the listing. Lines 6610-6650 have got themselves inserted between lines 6140 and 6150.

Although it doesn't affect the operation of the program I'm curious to know what the comment was whose remains appear between lines 6600 and 6660. – **J.L. Bulmer, Brightstone, Newport.**

● Thanks for pointing out the hiccups in Find and Replace. Fortunately as you say it does not affect the program. The comment belongs at the end of line 6650.

```
  990 .nowend
 1000 OPT FNequb(0)
 1010 OPT FNequb(46)
 1020 OPT FNequs("No WEND")
 1030 .nowhile
 1040 OPT FNequb(0)
 1050 OPT FNequb(47)
 1060 OPT FNequs("No WHILE"
)
 1070 OPT FNequb(0)
 1080 .findwend
 1090 JSR get:CMP #ASC"W":B
NE findwend
 1100 JSR get:CMP #ASC"E":B
NE findwhile
 1110 JSR get:CMP #ASC"N":B
NE findwend
 1120 JSR get:CMP #ASC"D":B
NE findwend
 1130 RTS
 1140 .findwhile
 1150 CMP #ASC"H":BNE findw
end
 1160 JSR get:CMP #ASC"I":B
NE findwend
 1170 JSR get:CMP #ASC"L":B
NE findwend
 1180 JSR get:CMP #ASC"E":B
NE findwend
 1190 JSR findwend:JMP find
wend
 1200 .get
 1210 JSR getbyte:CMP #&D:B
EQ newline
 1220 RTS
 1230 .newline
 1240 JSR getbyte:BMI nowen
d
 1250 JSR getbyte:JSR getby
te
 1260 .getbyte
 1270 LDA &B:CLC:ADC #1:STA
&B
 1280 LDA &C:ADC #0:STA &C
 1290 LDY #0:LDA (&B),Y:RTS
 1300 ]
 1310 ENDPROC
 1320 DEF FNequs(string$)
 1330 $P%=string$
 1340 P%=P%+LEN(string$)
 1350 =PASS
 1360 DEF FNequb(byte)
 1370 ?P%=byte
 1380 P%=P%+1
 1390 =PASS
 1400 DEF FNequw(word)
 1410 ?P% =word MOD &100
 1420 P%?1=word DIV &100
 1430 P%=P%+2
 1440 =PASS
 1450 DEF PROCinit
 1460 oswrch  =&FFEE
 1470 osword  =&FFF1
 1480 osbyte  =&FFF4
 1490 IF ?&8015=49 PROCone
ELSE PROCtwo
 1500 ENDPROC
 1510 DEF PROCone   :REM Ba
sic 1
 1520 checkend=&9810
 1530 continue=&8B0C
 1540 evaluate=&9B03
 1550 integer =&929F
 1560 ENDPROC
 1570 DEF PROCtwo   :REM Ba
sic 2
 1580 checkend=&9857
 1590 continue=&8B9B
 1600 evaluate=&9B29
 1610 integer =&92EE
 1620 ENDPROC
```

Program II

```
   10 REM WHILE-WEND
   20 REM Nested loop demo
   30 REM
   40 ?&80=0
   50 X=0
   60 WHILE X<=10
   70 PRINT "X=";X:X=X+1:Y=
0
   80 WHILE Y<5
   90 PRINT TAB(10)"Y=";Y:Y
=Y+1
  100 PROCprintz
  110 WEND
  120 WEND
  130 END
  140 DEF PROCprintz
  150 Z=0
  160 WHILE Z<3
  170 PRINT TAB(20)"Z=";Z:Z
=Z+1
  180 WEND
  190 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 143.

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TELESOFTWARE

is the name for computer programs which are broadcast as Teletext. Thus they may be loaded "OFF-AIR" into your Model B instead of being loaded from, say, tape or disc. Both Channel 4 and BBC are broadcasting FREE telesoftware. Because of the special nature of teletext these programs are frequently updated – so you will not see the same thing each time you run the program.

STORING PAGES

With the Volex Adaptor it is possible to send received pages to your printer or to disc or cassette for storage and later recovery.

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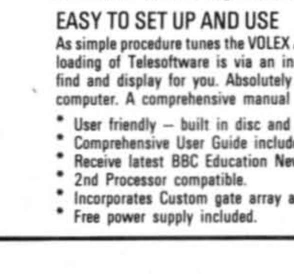

Originally designed for producing large circuit diagrams, DIAGRAM has now been improved to the point where it is invaluable for anyone who wishes to produce large areas of mixed graphics and text, and has many of the features normally found only in very expensive text/graphics processors.

DIAGRAM utilises a unique method of storing information on disc which allows not only very large diagrams to be created, but also allows rapid 'scrolling' of the screen both horizontally and vertically over the full area of the diagram.

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FEATURES

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- Other features include selectable display colours, TAB settings, Index names, and many more.
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What it offers the BBC Micro user . . .

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The number of bulletin boards is growing rapidly. The only snag is that the vast majority are single-user boards – which means lots of other people are also trying to make contact and all too often all you get is the engaged tone. But with the MicroLink bulletin board there is no limit to the number of people using it at the same time. And no limit to the number of categories that can be displayed on the board.

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We're only a local phone call away

The majority of MicroLink subscribers can connect to our mainframe computer in London by making a local phone call. This is possible because they use British Telecom's PSS system, which has access points all over Britain. A local phone call is all you need, too, for direct access via MicroLink to all the other countries belonging to the international Dialcom system.

Telemessages – at a third off

The modern equivalent of the telegram is the telemessage. Send it before 10pm and delivery is guaranteed by first post the following day (except Sunday). The service was intended for people phoning their message to the operator, which costs £3.50 for 50 words. But you can now use it via MicroLink, for only £1.25 for up to 350 words! For an extra 65p your message can be delivered in an attractive greetings card.

Go teleshopping on your micro

With MicroLink you can study the British Rail timetable – and then buy your ticket in advance. You can book theatre tickets. And even order a bouquet of flowers. It's all part of the teleshopping revolution!

Send and receive telex messages

With MicroLink you can turn your micro into a telex machine, and can send and receive telex messages of any length. You will be able to communicate directly to 96,000 telex subscribers in the UK, 1½ million worldwide – and even with ships at sea via the telex satellite network. Business people can now send and receive telexes after office hours, from home or when travelling.

What does it all cost?

Considering all the services you have on tap, MicroLink is remarkably inexpensive. You pay a once-only registration fee of £5, and then a standing charge of just £3 a month. On-line costs are 3.5p a minute (between 7pm and 8am) or 11p a minute during office hours. There is an additional 2.5p a minute PSS charge if you are calling from outside the 01- London call area. Charges for telex, telemessages and storage of files are given on the next page.

How much it costs to use MicroLink

Initial registration fee: £5.

Standing charge: £3 per calendar month or part.

Connect charge: 3.5p per minute or part – cheap rate; 11p per minute or part – standard rate.

Applicable for duration of connection to the Service. Minimum charge: 1 minute.
Cheap rate is from 7pm to 8am, Monday to Friday, all day Saturday and Sunday and public holidays; Standard rate is from 8am to 7pm, Monday to Friday, excluding public holidays.

Filing charge: 20p per unit of 2,048 characters per month.

Applicable for storage of information, such as telex, short codes and mail files. The number of units used is an average calculated by reference to a daily sample.

Information Databases: Various charges.

Any charges that may be applicable are shown to you before you obtain access to the database.

MicroLink PSS service: 2.5p per minute or part (300 baud); 3p per minute or part (1200/75 baud).

Only applies to users outside the 01-London call area.

Telex registration: £10.

Outgoing telex: 5.5p per 100 characters (UK); 11p per 100 (Europe); 18p per 100 (N. America); £1.25 per 400 (Rest of world); £2.75 per 400 (Ships at sea).

Deferred messages sent on the night service are subject to a 10 per cent discount.

Incoming telex: 50p for each correctly addressed telex delivered to your mailbox. Obtaining a mailbox reference from the sender incurs a further charge of 50p.

It is not possible to deliver a telex without a mailbox reference. If a telex is received without a mailbox reference the sender will be advised of non-delivery and asked to provide a mailbox address.
Each user validated for telex and using the facility will incur a charge of 6 storage units a month. Further storage charges could be incurred depending on the amount of telex storage and the use made of short code and message file facilities.

Telemessages: £1.25 for up to 350 words.

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If you have a BT Radiopager you can be paged automatically whenever a message is waiting in your mailbox.

International Mail: For the first 2,048 characters – 20p to Germany and Denmark; 30p to USA, Australia, Canada, Singapore, Hong Kong and Israel. For additional 1,024 characters – 10p; 15p.

These charges relate to the transmission of information by the Dialcom service to other Dialcom services outside the UK and the Isle of Man. Multiple copies to addresses on the same system host incur only one transmission charge.

Billing and Payment: All charges quoted are exclusive of VAT. Currently all bills are rendered monthly.

Software over the telephone

MicroLink is setting up a central store of software programs which you'll be able to download directly into your micro. The range will include games, utilities, educational and business programs, and will cover all the most popular makes of micros.

Talk to the world – by satellite

MicroLink is part of the international Dialcom network. In the USA, Australia and a growing number of other countries there are many thousands of users with electronic mailboxes just like yours. You can contact them just as easily as you do users in Britain – the only difference is that the messages from your keyboard go speeding around the world via satellite.

What you need to access MicroLink

You must have three things in order to use MicroLink: a computer (it can be any make of micro, hand-held device or even an electronic typewriter provided it has communications facilities), a modem (it can be a simple Prestel type using 1200/75 baud, or a more sophisticated one operating at 300/300 or 1200/1200 baud), and appropriate communications software.

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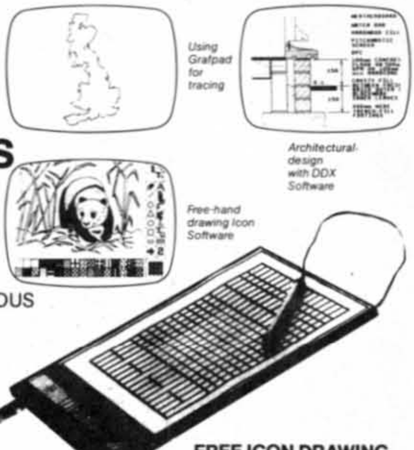

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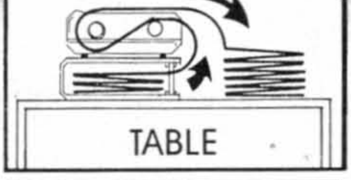

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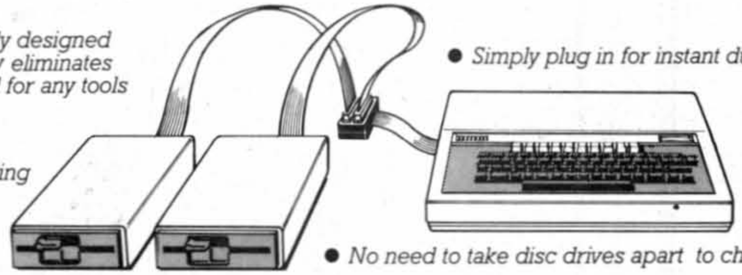

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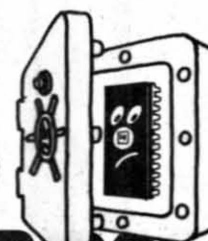

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The safest way to look after your growing collection of ROMs is to store them in Viglen's specially designed cartridge systems, this not only keeps them happy, but also removes the risk of damage to your BBC micro.

There are two systems – the 'Standard' and the 'Low Profile'. Viglen is the leading producer of both.

ADVANTAGES OF VIGLEN ROM CARTRIDGE SYSTEM

● All cartridges are gold-plated for durability and reliability, unlike others which are only silver plated. ● No need to switch machine off between cartridge changes. ● Insert and remove 'Wordwise' 'View' 'Disc Doctor', etc., at will, from your micro in absolute safety. ● Low, low power consumption unlike other systems. ● Save on memory.

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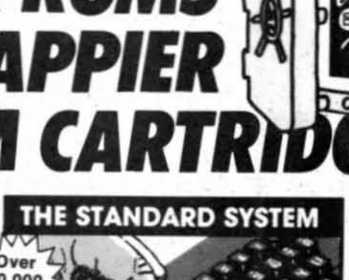
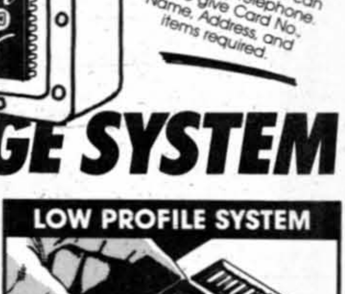
Over 50,000 sold

THE STANDARD SYSTEM



The Standard System used extensively in education is preferred, due to its robust construction and ease of use.

LOW PROFILE SYSTEM



With the sideways entry on the low profile system access to the escape and tab keys are slightly restricted. However Viglen betters its rivals in this respect by being 3mm lower.

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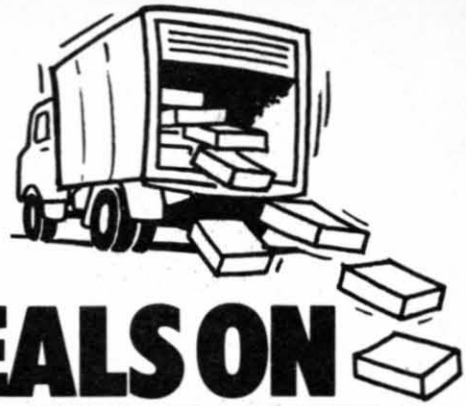

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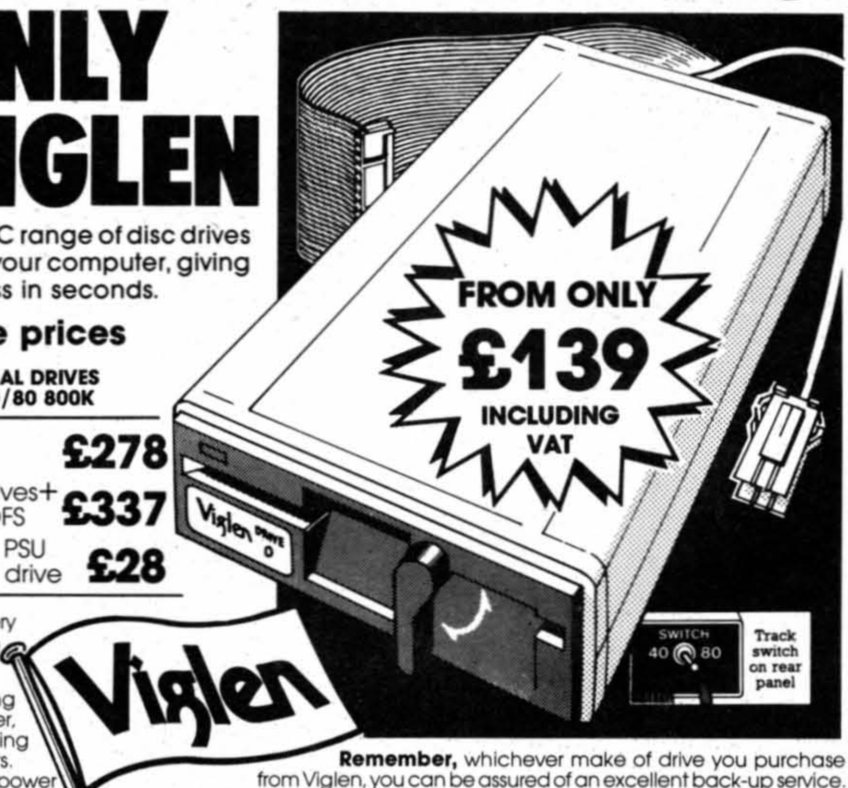

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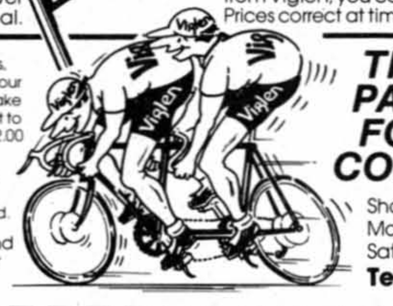

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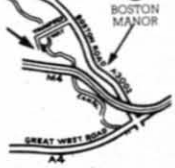

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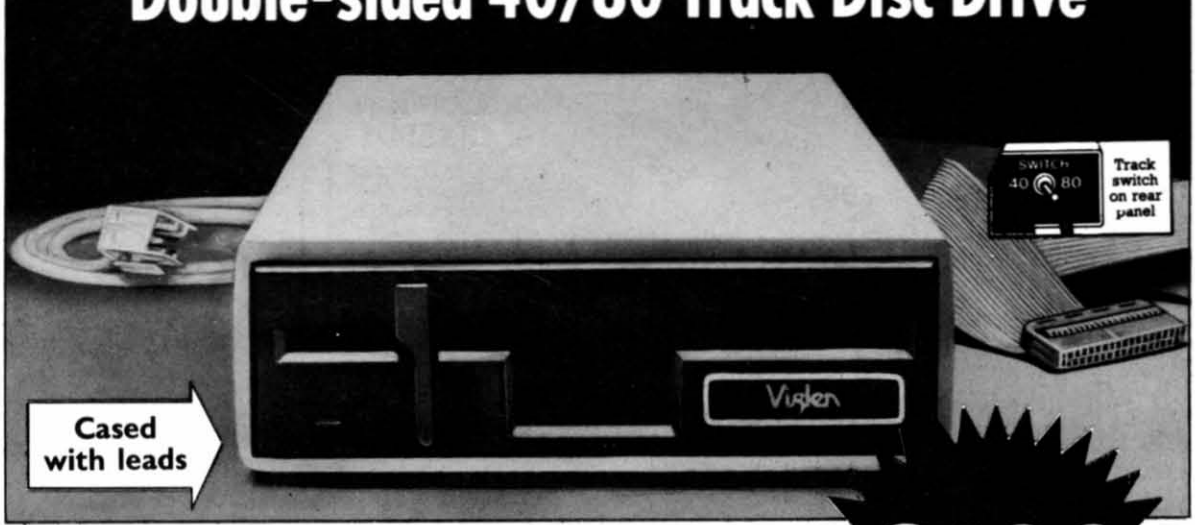

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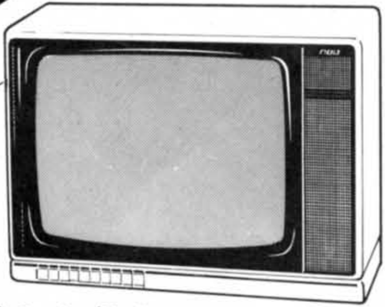

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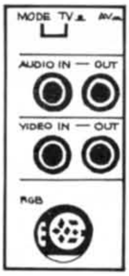

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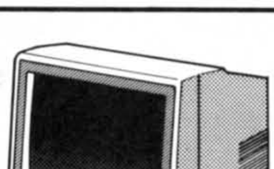

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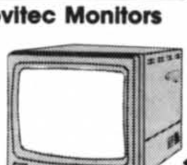

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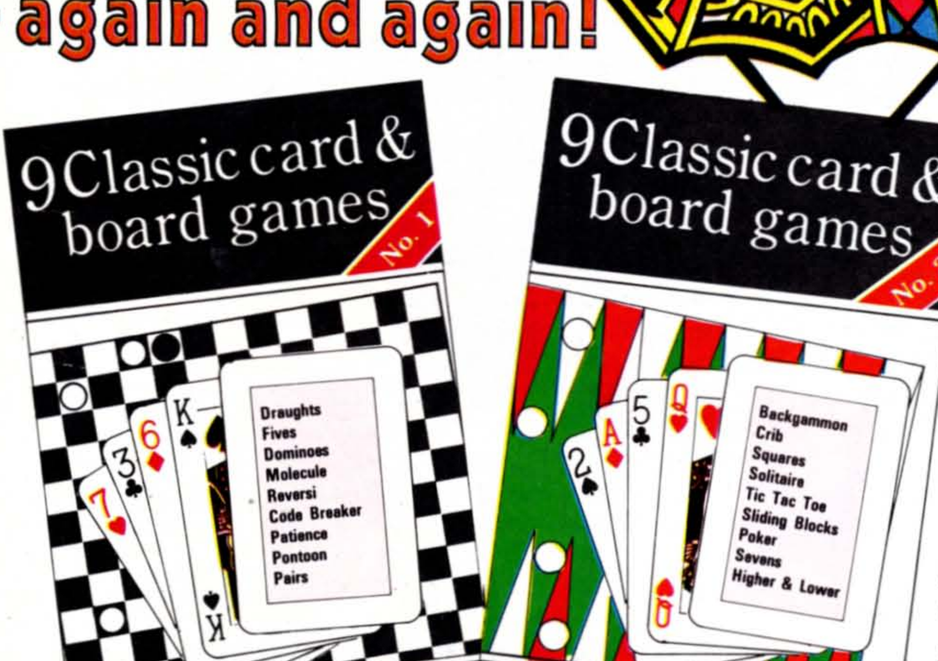
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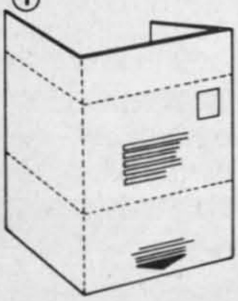

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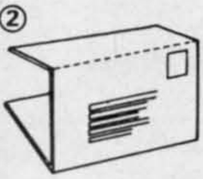

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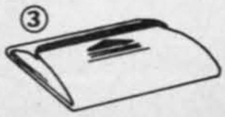

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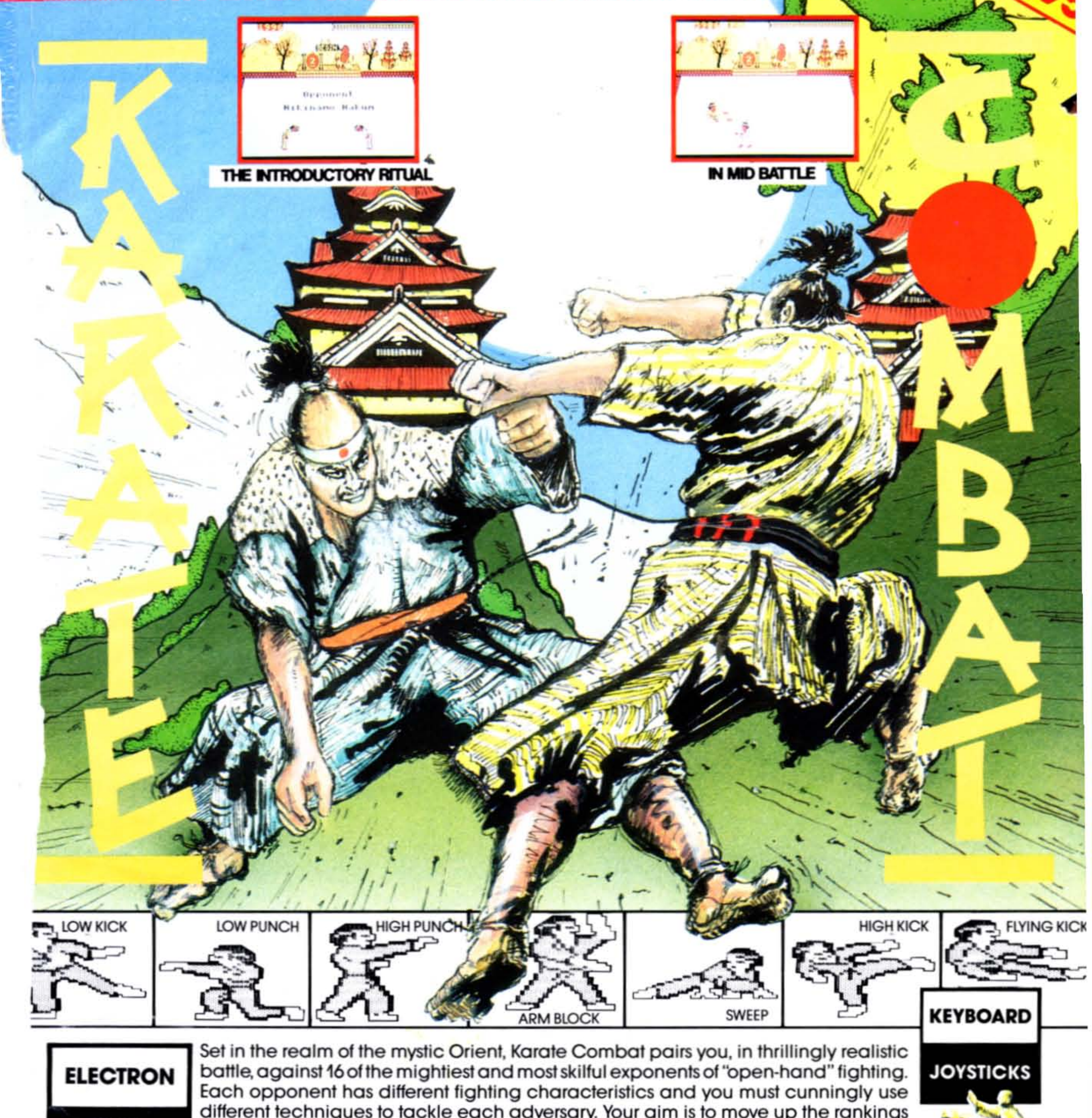

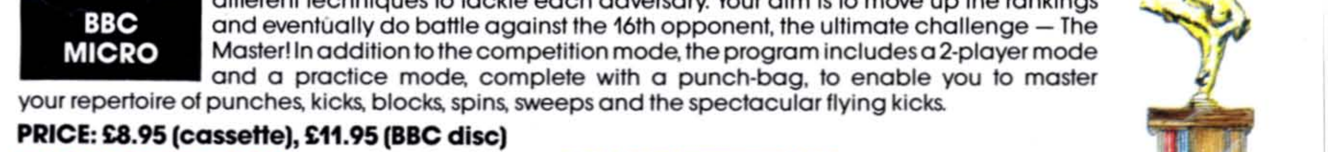

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BUSINESS MICRO USER

The BBC Micro down on the farm

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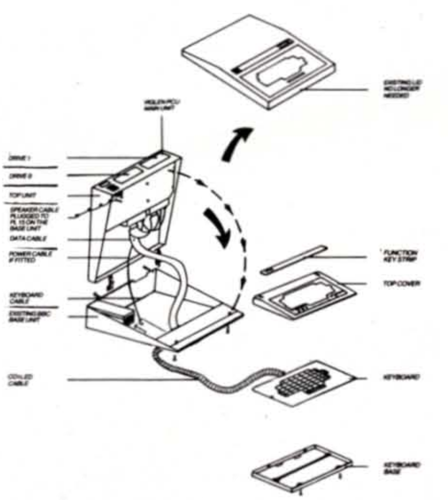
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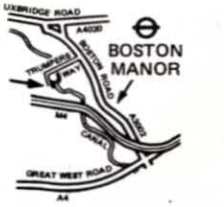
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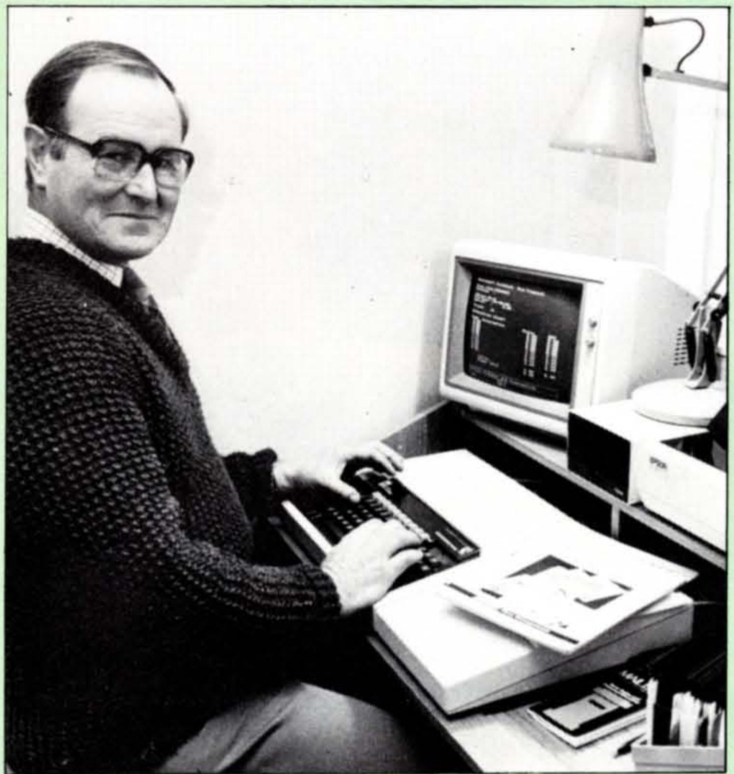

David Verity: "Market information alone paid off the investment ..."

Helping hand for the 'office farmer'

REGINALD JONES looks at the computerised management techniques which promise to revolutionise the agricultural industry

AS Britain's agricultural industry becomes increasingly more sophisticated, thousands of farmers find themselves bogged down with tedious but essential paper work.

Even the National Farmers Union with a membership of 117,000 finds it impossible to put a total on the amount of time spent on what they call office farming.

That wasted time is now being rapidly filled by computerised management techniques.

Last year the Acornsoft Farm Management package was released which consists of four modules, FarmCash for accounting, FarmPlanner covering land availability and labour, FieldFile for detailed record keeping of up to 80 fields and cropping, and finally CapCost for investment appraisal.

A version of the package which will run on the BBC Micro, B+ and the Master series for Econet and Torchnet have now been released by Rural Planning Services.

Costing from £750 to £975, it was promoted on a trial basis in Scotland, where they now sell two a week, and the East Midlands. Now the launch is going to the rest of the country on a regional basis. First will be East Anglia, where arable farming is ideally suited to the package.

Although the programs are aimed at farms from 150 to more than 3,000 acres, agricultural colleges have been showing interest – six already have it in use.

Farmer David Verity, 52-year-old ex-chairman of the Worcester County branch of the National Farmers Union, was one of the first to buy one for his

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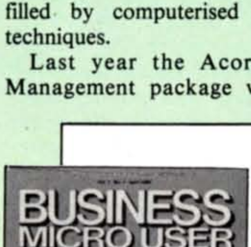
Expert advice for the business user



BUSINESS MICRO USER

The BBC Micro down on the farm

WELCOME to the first issue of *Business Micro User* – a new section of the magazine that in the months to come will act both as guide and forum for the growing number of readers of *The Micro User* who are using their machine as an office tool. Although it started life as a games and educational machine, the BBC Micro has been fulfilling an ever-increasing role as a serious business computer.

The arrival of the Master series – and its spectacular initial sales – will certainly accelerate this trend and create an entirely new generation of users.

Hence the launch of *Business Micro User*. In its pages you will find expert help and advice to ensure you make the most of your machine's potential, reviews of all the latest products, and stories of how people like yourself are using the BBC Micro to increase the efficiency of their business.

We would also like to hear from YOU – both about your achievements and your problems. The address: *The Editor, Business Micro User, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.*

From Page 3

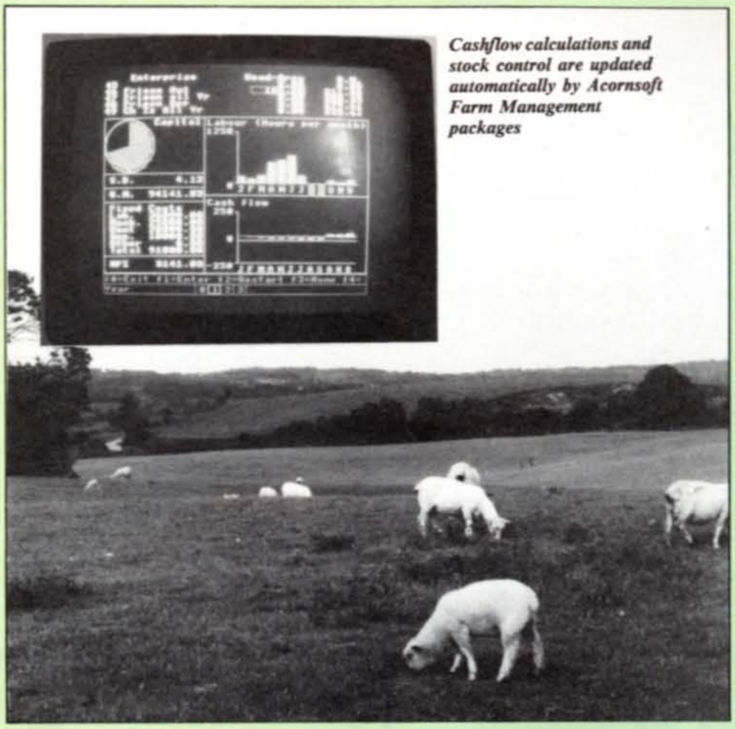
320 acre farm at Droitwich.

He has a 100-strong herd of milking cows and grows wheat and barley. He has joined the NFU's closed user group on Prestel. "It soon paid off", he says. "The market and prices information alone more than paid me for the investment in the first month.

"I have always been keen on gadgetry and the Farm Package was priced right for the average farmer. My wife, Sheila, who runs the farm with me, is very keen on our BBC Micro, which she finds most useful.

"The instruction was first class but, of course, I am still learning new techniques. It enables me to rotate my crops properly and keeps my cash performances up to date. It saves a lot of pencil work and allows me to spend more time on what I want to do – real farming".

He smiled when he said an added bonus will come when he has, at last, spare time for his relaxing hobby – sailing with his wife in their Enterprise dinghy on the River Severn.



Cashflow calculations and stock control are updated automatically by Acornsoft Farm Management packages

ALL the Acornsoft Farming Package modules are capable of using relevant information from other modules as part of their calculations and FarmPlanner has a facility for obtaining any necessary price information from either Prestel Farmlink or the BBC Ceefax teletext service, which require the use of a Prestel adapter or Teletext adapter.

The FarmCash electronic cashbook program contains all the features necessary for the maintenance of the farm's day to day and month to month financial affairs.

Transactions are easily entered, either cash or cheque, VAT calculations and monthly returns are automatic. Individual trader account records may be kept and records of unpaid transactions allow automatic production of creditor and debtor lists with totals.

Cashflow calculations can be linked to the FarmPlanner module for automatic updates. Stock control is automatic, being updated by transaction entry and by records programs such as FieldFile.

FieldFile allows full detailed record keeping of up to 80 fields. The records include field profiles, five years cropping and field summary, and current crop information.

The crop/field matching program allows the user to easily plan the optimum crop for each field, then using detailed crop information monthly action lists for each field may be produced. The action lists will automatically include estimates for the amounts of fertiliser and sprays required and of the required man hours that need allocating.

When actions are taken and entered on the computer, field records are updated and the stock control file amended (FarmCash).

A field performance monitor, with graphical output, is provided. This allows investigation of costs and outputs on a field-by-field basis, evaluating performance down to the last litre of spray.

FarmPlanner is a two part module. The first part is the FarmPlanner itself while the second is the Enterprise Database which will provide data for planning decisions.

FarmPlanner allows the optimisation of a business plan taking into account land availability, labour, cashflow and capital constraints. Several reference profiles are provided allowing the user to make comparisons with national standards and to use either supplied figures or new figures specific to the plan.

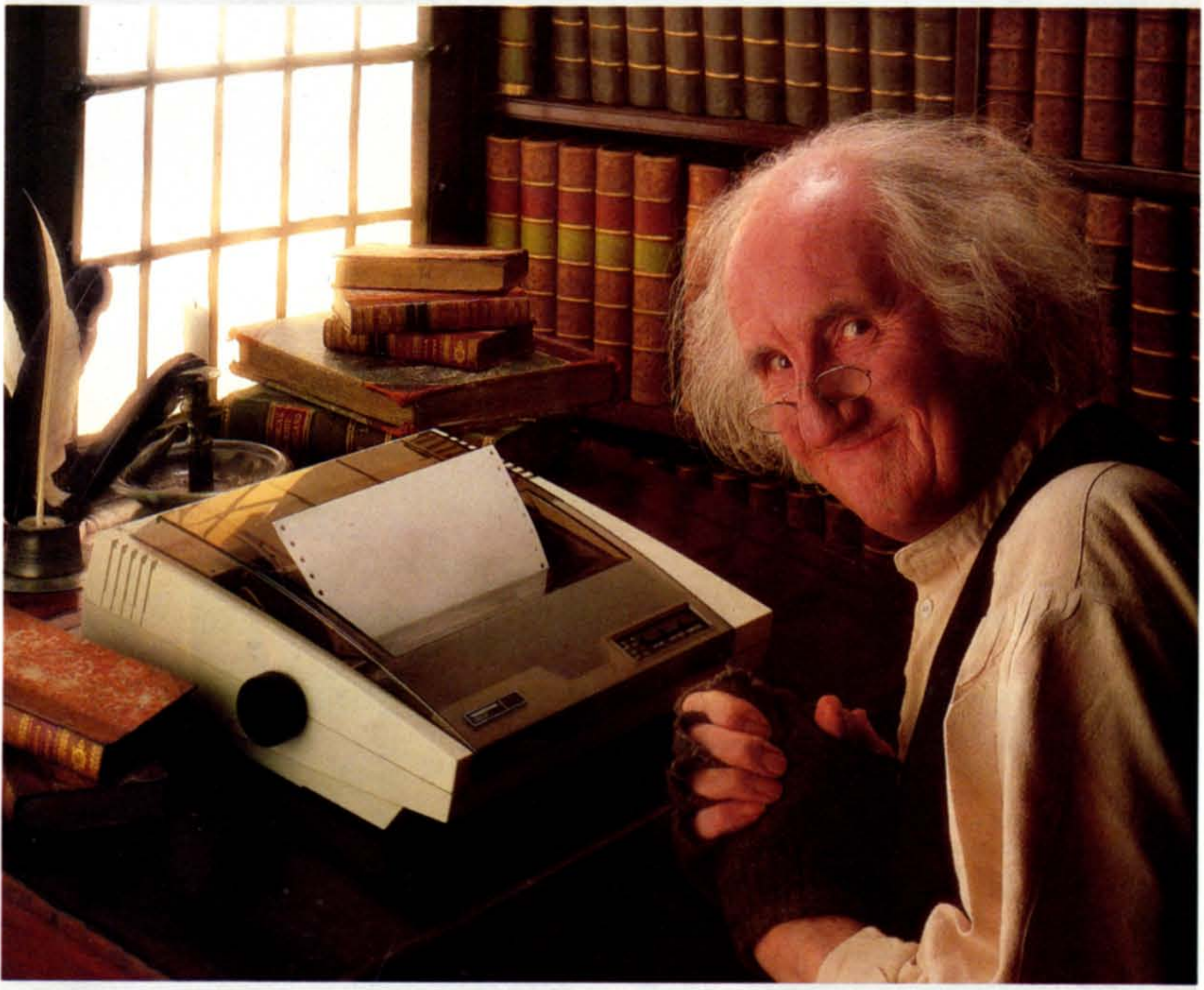
The completed plan becomes the reference for the cashflow and stock control monitoring functions of FarmCash. FieldFile or one of the alternative record keeping programs will also use the FarmPlanner records when generating action lists and for detailed planning.

The Enterprise Index allows the specification and storage of all financial and statistical data likely to affect long term planning. If used with a Prestel adapter, information can be automatically incorporated from the Prestel Farmling database. Alternatively a Teletext adapter can obtain information from the farming pages of the BBC Ceefax service.

CapCost provides a flexible means of appraising investment strategies for machinery, buildings and other forms of capital investment. It will cope with most of the variables involved with long term investments, providing automatic comparisons of alternative schemes and allowing the user to present his funding agency with detailed reasoning for any proposed plan.

In addition to the core package, other modules are planned to meet differing needs. Four will be similar in function to Fieldfile but configured for specific areas of farming – DairyFile, StockFile, PigFile and PoultryFile.

Thrifty micro owners choose the new MT80+



Keen on saving money? But not prepared to sacrifice quality and performance? Then the new MT80+ serial matrix printer has plenty to offer at a price that will have you rubbing your hands with glee.

The MT80+ prints at 100 cps and is compatible with just about any popular office or home micro. For true print flexibility, there's compressed and expanded print, subscripts and superscripts, bold print, italics and, of course, graphics.

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Commstar THE communications software for the BBC, *is now better than ever!* The new enhanced version now available on a 16K Eprom is totally compatible with the new Master Series BBC computer. Commstar's features are too numerous to list here, so please ask for a fact sheet.

Available also for Commstar, is a Technical Appendix Manual for advanced users.

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View is growing

View, Acornsoft's versatile word processor, is only part of a whole family of interrelated programs and utilities. The recent release of View 3.0, and its inclusion as standard in the Master series, guarantees its future. Here RORY McCLOY takes a close look at two extremely useful members of the View family – a printer driver and an index.

Program: Printer Driver Generator
Price: £9.95 (cassette), £11.50 (disc)
Supplier: Acornsoft, c/o Vector Services, Denington Industrial Estate, Wellingborough, Northants NN8 2RL. Tel: (0933) 79300

A PRINTER driver is a section of machine code, limited to 256 bytes and residing at memory location &400, which interprets instructions from View into codes that the printer will understand.

This allows you to modify the output of the printer from commands embedded in your text depending on the type of printer.

Most dot matrix printers can be instructed to produce pica, elite, proportional, condensed and near letter quality fonts with the addition of underlining, italics, bold and/or emphasised, enlarged, superscripted and subscripted features to the printing.

Daisywheel printers are usually limited to underlining or bold type. Super or subscripting requires reverse and forward half-line feeds.

The default printer driver built into View is limited to two highlights, underline and bold, and even these control codes are not correct for every make of printer.

To change the highlights to produce other print styles requires highlight1 or highlight2 to be redefined using the HT command to another printer code. This is a cumbersome procedure which still limits you to two print features at any one time.

Highlight	*Effect (after stored command HT 2 130 is in text).*
_	Switch underlining on/off, cancelled at end of line.
***	Switch bold on/off.
*	Next character part of extended character set.
*_	Begin subscripting, cancelled at end of line.
**	Begin superscripting, cancelled at end of line.
**_	Return to normal print after sub- or superscript.
*__	Switch alternative font on/off.
_	Switch italics on/off.
*___	Reset all functions off (use at start of document).
__	Used by View Index only.

Figure I: Multiple highlight effects

The Acornsoft printer driver now allows multiple highlights using a combination of highlight1 (underbar) and highlight2 (asterisk) markers (see Figure I). Repeating the combination of markers switches off most of the chosen effects.

The only requirements are that highlight2 is redefined to 130 (HT 2 130) at the start of the text and that a specific printer driver created by this generator package has been loaded using the PRINTER command. You can now have all the advantages of View text, formatted on the screen as you enter it, together with multiple embedded printer commands, a feature favoured by Wordwise users.

The printer driver package comes as a disc or cassette (easily transferable to disc) with an excellent 39 page manual. Printer drivers, already compiled, are provided for the Epson FX80, Ricoh Flowriter, Facit 8105, Juki 1600 and JP101 printers, but the main feature is the generator program which allows you to create a block of machine code specific for your printer – provided you can understand the summary pages of your printer manual.

To help you overcome this potentially unsurmountable problem the generator instructions, together with the printer driver manual, are very friendly. They offer the useful suggestion of loading an existing printer driver answer file, which most closely resembles your dot matrix or daisywheel printer, into the generator so that you can see how to answer the prompts from the generator with the option of changing the answers or codes as necessary.

I was able to modify the Epson and Juki answer files to create printer drivers for my NEC 8023 (dot matrix) and Brother (daisywheel) printers within a few minutes.

The generator allows you to define six print features. They do not have to be limited to those listed in Figure I. For example, if the appropriate codes are used the embedded highlight *_* could define enlarged print rather than italics. In addition, the generator can create a limited extended character set of 2 to 32 predetermined characters, such as the degrees sign or French accents (on dot matrix printers only), depending on the number of other features chosen.

I was pleased to find the pad (exact space) character included – a regrettable omission from the original View program.

In this printer driver the @ character appears on the screen but is printed as a space thus fixing the space between words and prevents splitting of two words at the end of a line or filler spaces being inserted during formatting of lines.

However, this printer driver is not without its shortcomings. Combining print features, such as bold elite font with underlining, fails to work unless spaces are left between the sets of highlights, for example *** *__ _. Therefore it is not possible to have a heading requiring more than one highlight definition starting exactly at

→

From Page 7

the left margin.

Similarly, you have to be careful in which order you turn the print features on or off, making sure that the underlining is switched on last and switched off first if extra spaces are not to be underlined.

Although such multiple print features demand a long string of highlights to switch them on and then off again they are not as long as required in Wordwise.

The Acornsoft package contains two other useful and unique utilities. Typing *MPRINT in the command mode runs a program which allows users of View version 1.4 to print from memory using PRINT "" or SHEETS "", a facility built into later versions. The contents of a file in memory can also be included in a string of files being printed, for example:

PRINT file1 file2 "" file3

One drawback to embedded commands in the text, particularly the multiple highlights allowed by these printer drivers, is that they throw the text in the edit mode out of alignment, making it difficult to line up columns.

A screen driver utility goes some way to overcoming this and avoids unnecessary draft printouts. Typing *TOSCRN results in a printer driver called SCREEN to be loaded which intercepts the text output when SHEETS or PRINT are used and sends it to the screen. The text appears as defined complete with features such as bold, underlining, sub- or superscripts, italics and so on.

Non-emphasised text displayed in this way can be difficult to read in an 80 column mode on anything but a high resolution monitor since only half the normal number of pixels are illuminated. I found this screen driver very useful to discover where the top of a certain page started using *TOSCRN then SHEETS n (where n=page number). But beware typing *TOSCRN, it causes a NEW start and any text in memory is lost – SAVE your file first.

The manual caters for beginners and describes how to use a !BOOT file to auto-start a disc and get into View with a printer driver already loaded. It also gives an example file of function key definitions which can be *EXECuted from the !BOOT file, but surprisingly only defines keys for use from the command mode.

```
*FX228,1
*KEY0 PRINTER
NEC8023|M*FX5,1|M              REM: parallel printer driver.
*KEY1 SCREEN
*KEY2 SHEETS
*KEY3 *TOSCRN|M
*KEY4 |!$CE|M                  REM: loads screen driver.
*KEY5 |!$PE|M|M|!$LM|M0|M      REM: CE (centre entry).
*KEY6 |!#1                     REM: PE, LM 0 (page eject, left margin 0).
*KEY7 |!#2                     REM: set marker 1.
*KEY8 !!!!!! !!!               REM: set marker 2.
*KEY9 Yours sincerely,         REM: *_* italics on/off.
|M|M|M||MRory McCloy|M
*KEY10 *FX228,1|MOLD|MMODE     REM: Reset Ctrl+Shift f-keys
3|MPRINTER CE-60|M*FX5,2|M     recall old text and serial printer driver.
```

*Figure II: Personalised View f-key definitions typed in edit mode (without the REM statements), saved, then *EXECuted in command mode (by !BOOT file for disc users).*

The manual fails to mention *FX228,1 which enables the function key definitions to be used in the edit mode if the f-key+Shift+Ctrl are pressed together (see *The Micro User* December 1984, page 82).

Figure II shows my own personalised choices for f-key definitions. Keys 0-3 are used in the command mode (you don't need to press Shift+Ctrl) while keys 4 to 9 provide a fourth level of functions in the edit mode.

The definition of key 8 with the codes for *_* (highlight2/highlight1/highlight2) shows how this key can be used to provide the embedded commands for italics on/off at a single key stroke (f8+Shift+Ctrl).

You could program other printer features or fonts on the other keys using combinations of higlight1 (!!space) and highlight2 (!!!) codes. Key 9 ends a letter for me and the definition of key 10 prevents loss of text when Break is accidentally pressed.

The generator can be bought separately, but is included in the View version 3.0 package which is not only meant to be free of previous View bugs (does anyone know different?) but supersedes Hi-View and automatically relocates across the 6502 Second Processor. Overall it adds long-awaited muscle to my favoured word processor.

Three easy steps to an index

Program: ViewIndex
Price: £14.95 (disc only)
Supplier: Acornsoft, c/o Vector Marketing, Denington Industrial Estate, Wellingborough, Northants NN8 2RL. Tel: (0933) 79300

HOW can I tell my secretary that having just completed typing 40,000 words of a book into View files that she now has to make an index?

Just in time a package containing ViewIndex came to my rescue and is an excellent demonstration of the in-depth capabilities of the View suite of programs from Acornsoft.

The package (for disc users only) of programs on disc allows you to create an index by page numbers or section

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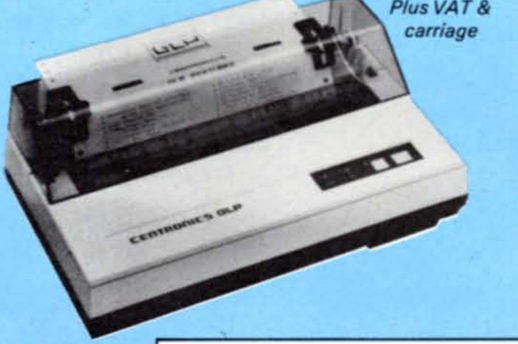

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From Page 8

numbers in three very easy steps.

Words or phrases in each of the View text files are highlighted using a double 'Highlight1' command (see Figure I) before and after the word or phrase (up to 50 characters long).

Then load the ViewIndex printer driver by typing PRINTER INDEX and create an intermediate index file, not readable by View, by typing:

```
PRINT (templatefile) (textfile1)
        (textfile2) ........
```

The ViewIndex disc contains two template files, TPP and TPS, for index by page number or section number. They can be loaded easily and altered if required. Creating a page number index is very simple but the section number index requires a macro to be called by entering an appropriate EDIT command in the text files to be indexed at the start of each chapter, section and subsection. A final index file is created by the ViewIndex sort program run by !BOOTing the ViewIndex disc.

This file offers options on the final layout of the index – for example right justification of the page numbers – and can be loaded into View for a final check and edit before printing.

After quickly scanning the simple 22 page manual I was able to create a page number index containing 78 word/phrase entries from a 6,800 word document on three text files in a remarkably short time.

ViewIndex took only 1min 30secs to create an intermediate file by picking out the double highlighted words and phrases and a further 1min 20secs to read this file, sort it into alphabetical order using up to 50 characters and write the formatted index of 78 entries back to disc.

From my first read of the manual, insertion of the text highlights, to final printout of the index had taken just 30 minutes.

The ViewIndex disc comes with part of the manual entered as a text file for you to use as an example and practice creating an index.

It is a pity that relatively few BBC Micro users will be writing books or manuals and need to buy this quite outstanding, and thoroughly professional, utility.

Wordwise users who have already written their book could use ViewIndex (as long as they have View as well) by READing their Wordwise files into View, set the double highlights (ignoring the Wordwise embedded commands) and SAVE as View files, then proceed as described earlier in this article.

‘ViewIndex is quite outstanding and thoroughly professional’

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-MICRO MEDIA-MICRO MEDIA-MICRO MEDIA-MICRO MEDIA-

JO STORK tells why he dislikes many business packages

More power – but software lags behind

A RECENT query from a client made me think why I am increasingly seeing business software which is slick, reliable and stuffed full with seemingly highly desirable features, but which I cannot recommend whole-heartedly.

There are many reasons why this can be so, but at the heart of them all I detect a worrying trend.

In the years since micros first appeared everyone has unfortunately concentrated on the hardware's capabilities resulting from the electronic advances. As far as business users are concerned few have realised that this has been coupled with a gradual erosion of good systems design.

Everyone is aware of the progress that has been made in electronics. But few are aware how relatively little progress has been made in the many other aspects of computing. Even fewer users are aware of how bad systems design is frequently disguised by the ever improving performance of the hardware.

Granted there have been many software developments, but try to think of one to rank with the following:

Each of my five office micros has more memory, more disc storage and in two cases more processing power than the room-sized number cruncher I first used in 1969. Furthermore, their total cost is probably not much more than was paid for 512 bytes of that mainframe's core memory.

Software has also advanced, but much more slowly. While certainly much easier to use than 17 years ago and also offering more facilities, particularly in the case of operating systems, progress has mainly been limited to utilising this new technology.

This is particularly true of file handling, since in 1969 the majority of computers used only tapes as off-line storage, and most data input was via 80 column punch cards.

Excessive faith

While the tools available have been dramatically improved, the tasks Mr Average wishes the computer to perform have not changed at all. Some applications were only computerised in the last five years simply because it required massive hardware price reductions before a small organisation could consider them candidates for computerisation.

This widely unequal development has had several unfortunate effects, one of which is Mr Average's excessive faith in the power of the chip, while failing to consider the other two sides of his systems triangle, the software and the task.

Many users fail to realise that being delighted with a computer's word processing or spreadsheet performance is no guarantee that other applications are going to be equally successful.

You need to analyse four elements of a computer's performance to ensure that a task will computerise efficiently. Even when this is done, it is no guarantee that the software will prove suited to the job.

These four elements are:

- *Processor power.* Representing the number of calculations and data

Salutory reminder

A PROUD record of 17 years disintegrated through my own carelessness. I will recount it so that you may learn from my mistake.

I had always been diligent about ensuring my back-ups are up to date and therefore had never lost any data, despite the usual variety of hardware and software mishaps which a career in computing has accumulated.

The other day I was asked to append a few hundred words to a document I had produced. When this was done I naturally saved my work and immediately backed it up.

Unfortunately, owing to a set of circumstances which come under the classification brainstorm and subclassification finger trouble, all I saved was the short amendment. You've guessed it, I had not merged it with the original text.

The back-up I immediately made was therefore nothing more than a destruction of my last remaining copy of the original work.

By the time the error was discovered it was far too late for me to "unerase".

Had the data been more critical I am certain I would have paid more attention. Nevertheless, I will now be more careful than ever that I do not take a back-up of garbage.

This unhappy occurrence has been a salutary reminder that while time does make for more experience, it also leads to complacency and hence sloppiness.

transfers that it can handle in a given time.

- *Memory:* Representing the space available for the operating system, program and data before time-consuming input/output becomes necessary.
- *Type of off-line storage and ways in which data is retrieved from it:* Representing not just the cassette/disc capacity but whether genuine random access is possible.
- *Input/output time required:* Representing the time needed to enter the data, including file creation, and to display/print the results.

Looking at these four criteria more closely we find that the technology is rarely a constraint. Almost invariably it is the system's facilities or general design which causes the major implementation headaches.

Until recently the power available on a home micro was usually geared to giving acceptable graphic/animation speed or to ensuring that reasonable skills and reflexes were needed when playing games. As processor power grows and scientific co-processors become more common it is safe to say that it is now far in excess of what is required for debit/credit/plonk.

Only when your application requires considerable sorting of files or multiple reiterations of complex formulae is processor power likely to appear limited.

Now that memory is so cheap lack of it should never present a problem unless the off-line storage available is wholly inadequate. For many micros the amount supplied was governed by the games sector needing to hold large mazes or dramatic animations.

Off-line storage

If designers would adopt the tried and tested principles of employing several small programs to make up a system rather than one behemoth to perform all the tasks, you should never find memory in short supply.

It is the off-line storage which usually renders the micro inadequate for a particular commercial task. A few figures will demonstrate this.

Even the simplest stock system requires a minimum of 100 characters per stock record. Allowing for suppliers records, programs, losses due to formatting and a small amount of work area, a 400k disc can therefore store no more than 2000 such records. This represents a definite limiting value.

If only a 128k disc is available even 800 records will probably force considerable swapping of floppies at various stages of the system's running.

Setting aside other essential factors such as the speed of accessing individual records, it should now be obvious why 40 megabyte fixed discs are becoming increasingly common at the business end of the micro market, particularly if any networking is carried out.

Time consuming

These limits vary widely between applications. If the application had been payroll then 500 staff could be easily handled per 128k floppy, and yet firms with this number of workers are almost certainly in the mainframe league as far as data processing is concerned.

If you have ever keyed in a long program you will be well aware of how much time accurate data entry requires. Remember the most expert typist can enter no more than two characters per second. As for printers, they can cost more than your processor plus monitor if they must deliver over 140 high quality characters a second.

The four points I have made are virtually truisms and yet I witness with depressing regularity sensible people attempting to clip three nanoseconds off the processing time of a transaction which requires 18 seconds of data entry and three seconds of output. This is then compounded by the software houses marketing their wares on the basis of speed of calculation.

The BBC Micro is certainly a hacker's delight, but the average businessman is not interested in such facilities. He needs a load-and-go system which meets most of his needs with the minimum of familiarisation time.

In the days when multi-national organisations used computers with at most 48k of memory and a large specialist staff to operate them, elegant coding was more important than user friendliness. The one advantage was that you were provided with the essentials and no more.

With today's hardware every program should be slick. There is no excuse for a program being unreliable. Now that memory is so freely available, although the standard BBC Micro has one of the smallest of the popular micros, programs can usually contain all the options the designers wish to provide.

You should now understand why selecting your package is more than just finding polished, reliable and multi-option programs.

Without doubt the starting point must be whether the application is one which shows a satisfactory cost-benefit ratio on the hardware for which it was designed. Assuming this acid test is passed an assessment of the features on those available will follow.

Mercifully market forces weed out the truly miserable products, but sadly their demise can take time.

What you will find available usually results in a choice between many different possible solutions. The one which you buy must be the one which is the most user-friendly.

It should now be obvious how many reasons exist why I do not always recommend the slickest program. With the technology available there is no excuse for choosing a tortoise, but nevertheless speed is not everything.

> **‘Businessmen need a load-and-go system which meets most of his needs with the minimum of familiarisation time’**

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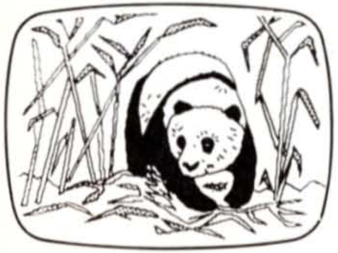

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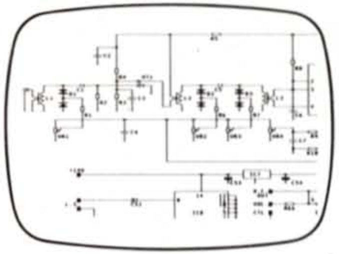

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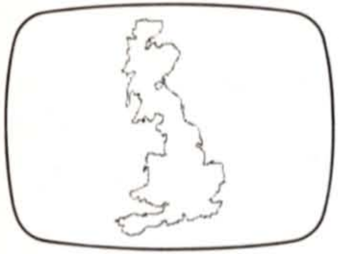

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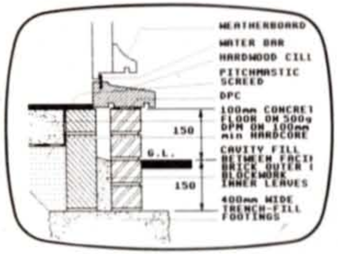
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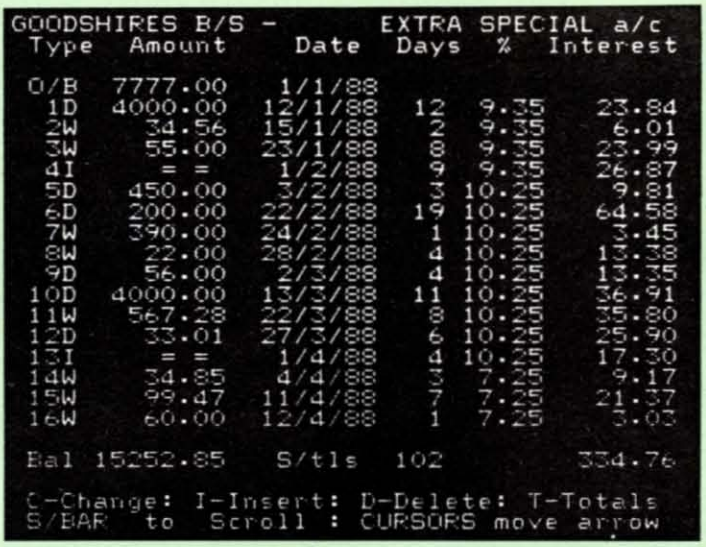

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I have tested three of Squirrel's programs:

- Cash Care copes with up to 60 categories of income/expenditure in either one or two accounts.
- Vat Care produces the three-monthly VAT liability reports on up to 240 sales or purchase postings per month.
- Building Society Care handles a maximum of 240 deposits, withdrawals or rate changes in any year to a building society account, thereby allowing one to know the interest earned at any given time.

It is curious that I received Cash Care at the same time as Bank Manager. While offering nothing like the facilities of the latter, it seems far better suited to the market into which it is pitched.

Programs: Cash Care £11.95 (cassette) £13.95 (disc)
Vat Care £14.95 (cassette) £16.95 (disc)
Building Society Care £9.95 (cassette) £11.95 (disc)
Supplier: Squirrel Software, 4 Bindloss Avenue, Eccles, Manchester M30 0DV. Tel: 061-789 4120

It is a great compliment when I say that this is the sort of program which you'd wish you could produce at home over a weekend.

At the cost of a take-away meal, Squirrel have taken all the chore out of getting a useful program.

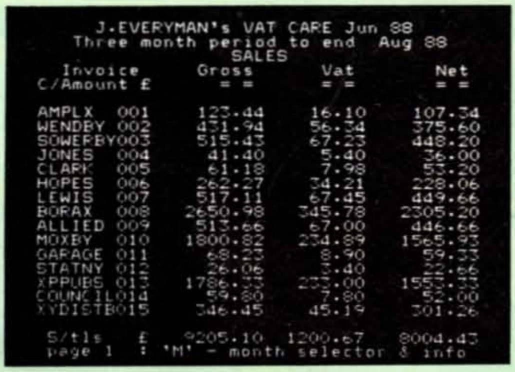
Vat Care adopts the same no frills approach. For the small tradesman who loathes keeping the books and is not interested in copious management information, this is the ideal system.

Whereas Bank and Vat Care work on the time honoured debit-credit-plonk principle, Building Society Care is more like a spreadsheet. This is so that you may experiment in order to test the effect of money being moved around.

Each row represents a transaction, while each cell of the matrix represents the detailed effect the transaction has upon the account.

At a cost of £10 to £15 each they represent excellent value for money.

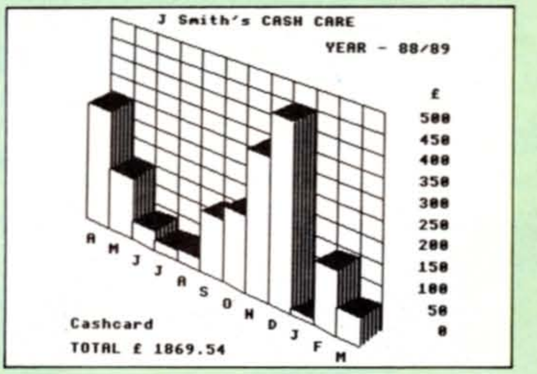
Joe Stork



```
      J.EVERYMAN's VAT CARE Jun 88
   Three month period to end  Aug 88
                 SALES
  Invoice      Gross       Vat        Net
 C/Amount £     = =        = =        = =

 AMPLX   001   123.44     16.10     107.34
 WENDBY  002   431.94     56.34     375.60
 SOWERBY003    515.43     67.23     448.20
 JONES   004    41.40      5.40      36.00
 CLARK   005    61.18      7.98      53.20
 HOPES   006   262.27     34.21     228.06
 LEWIS   007   517.11     67.45     449.66
 BORAX   008  2650.98    345.78    2305.20
 ALLIED  009   513.66     67.00     446.66
 MOXBY   010  1800.82    234.89    1565.93
 GARAGE  011    68.23      8.90      59.33
 STATNY  012    26.06      3.40      22.66
 XPPUBS  013  1786.33    233.00    1553.33
 COUNCIL014     59.80      7.80      52.00
 XYDISTB015    346.45     45.19     301.26

  S/tls    £  9205.10   1200.67    8004.43
  page 1   :  'M' - month selector & info
```



Managing a little too much, perhaps?

Program: The Bank Manager
Price: £17.50 (disc)
Supplier: Contex Computing, 15 Woodlands Close, Cople, Bedford MK44 3UE. Tel: 02303 347

THE Bank Manager from Contex Computing is a delightfully simple program which performs its task admirably and yet I wonder how successful it will be. Just how many people are there who require to keep track of and analyse up to 36 separate bank accounts?

Who needs cheque reconciliation, interests, credit cards, standing orders and so on to be analysed under a maximum of 99 different categories split into 12 monthly accounting periods?

Further facilities such as the ability to set a budget against any category and compare actual against target performance is possible, as is the automatic posting of regular payments to the appropriate account. Password protection is standard.

I stick by my opening statement that The Bank Manager is a simple program, despite this lengthy list of facilities. Data entry is a delight. The professional, chatty and comprehensive manual answered the few queries I had during operation. It is one of the few systems at this end of the market to have a sensible index.

The program is menu driven to select the required option, and uses question and answer for data entry and modification. When used for the first time the program automatically enters file-building mode.

While the fields to be filled are mandatory, you can select how many records are to be handled and in some cases, such as descriptions, can choose the field lengths.

This is particularly useful if only a single drive is available and several different accounts need controlling.

Postings are held on the system chronologically, which makes reconciliation simple. Transactions may be left unreconciled indefinitely. On completing the data entry you can select from a variety of reports. Complete files, or only those records which meet certain criteria may be listed. Simple histograms can also be produced.

A feature I particularly liked was the look ahead facility which allows a date in the future to be selected and an estimate of the balance likely at that time to be made.

As with any system, personal preference counts for much. Although most of my quibbles fall into this class, there is one of universal relevance.

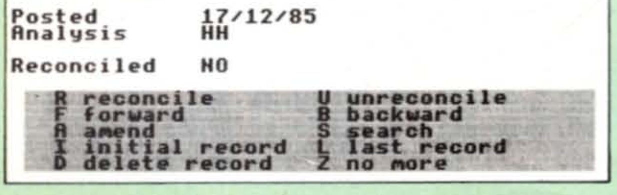
Despite the manual's strenuous warnings not to press Break during operation, I decided to test what would happen.

As predicted, my test files were left a shambles. I hope to see some disabling of this key implemented in future revisions.

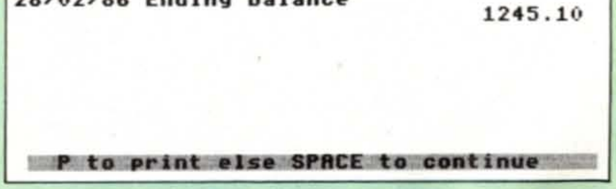
Despite regarding Bank Manager highly I believe that companies needing all these facilities will probably have more computing power available than a BBC Micro. What is more, the whole cash reconciliation system will then be linked in with the nominal ledger.

Although this is an excellent product I still wonder how big the market is.

Jo Stork



```
        Contex Bank Manager           19/02/86
  Bank     M      Midland Current A/c
         B/f bal         Unrec         Total
          100.00       -429.90       -329.90
      Reconciliation and Amendment
Cheque no.     123459
Amount         18.95
Description    Victoria Wines
Posted         17/12/85
Analysis       HH
Reconciled     NO
    R reconcile           U unreconcile
    F forward             B backward
    A amend               S search
    I initial record      L last record
    D delete record       Z no more
```



```
19/02/86      Itemised Look Ahead
     A/c M    Midland Current A/c
              Description
                Ref            Amount          Balance
              B/f balance
                                                100.00
19/02/86 Total unreconciled
                                429.90         -329.90
27/02/86 CU Life Insurance
                3                25.00         -354.90
28/02/86 Salary approx
                6             -1600.00         1245.10
28/02/86 Ending balance
                                               1245.10

    P to print else SPACE to continue
```

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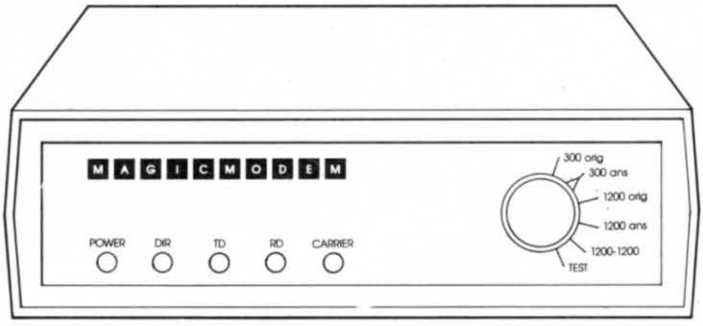

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MODEM

Quickcalc compares well with the really big boys

By JO STORK

QUICKCALC, as its name implies, is a spreadsheet. After considerable testing I came to the conclusion that for a system aimed at a relatively small machine, it stands up extremely well.

In ease of constant, variable and formula entry Quickcalc is typical of most spreadsheets in this respect. Manoeuvering round the work area and then making the entry is done in the time honoured manner adopted by the majority of software houses.

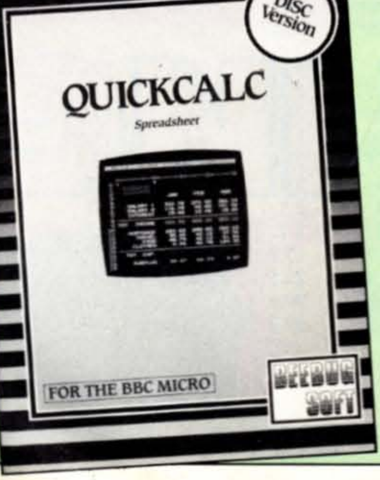
Moving the cursor a cell at a time, or a screen at a time when used in conjunction with the Shift key, or directly to cell, all work no differently to dozens of other products. There is nothing quirky or unexpected in this area.

The ever-present windows on the screen are particularly useful, if at times worrying. One indicates the amount of memory still available. This starts at a small number and seems to reduce at a horrifying rate, particularly if you are using considerable replication or quantities of text.

I would reckon on 600 cells as a realistic maximum unless your formulae are extremely simple or you really keep the text to an absolute minimum. This is normally more than sufficient for most purposes.

In ability to precisly define which rows and columns are to be output there is nothing remarkable about Quickcalc. Like the vast majority in its price range, only a single area can be output at one time. I have learnt to accept that the facility to print columns A-D, L, O and R-T is only available on the most sophisticated spreadsheets.

Nevertheless there are two features which I particularly like.



The first is the ability to direct set-up codes to the printer at any time, thereby allowing either the maximum density of print possible before the printout needs to be segmented or alternatively double sized characters for the maximum clarity when producing overhead projector slides and the like.

The second feature is that simple barcharts constructed from asterisks may be produced. The only problem with this is that it does require you to create a very wide column in order to work in a realistic scale. Placing the graphic area at the end of the work area gets it out of the way when you are still working on the screen.

I do not normally "open up" the software when testing. Had I done so I suspect that I would have found Quickcalc has a direct line to Basic. Twenty one arithmetic, plus a further four specialist functions, puts this product in the first division. Add to this the normal operators, both mathematical and logical, and you have enough facilities to calculate how big a disappointment Halley's Comet will be when it next comes this way.

In ability to alter the dimensions of the spreadsheet with the minimum disruption to other sections of the work area once again Beebugsoft have passed one of my favourite acid tests with flying colours.

I produced a 10×10 chi square matrix and obtained the results. If you don't know what one of these is, it doesn't matter. Suffice it to say that it uses some of the functions. Next I swapped columns 4 and 5, deleted row 1 (I had no titles), inserted a new row 10 and finally selected a change in the order of calculation. This last means that rather than calculate column by column I requested calculation row by row.

This whole operation took somewhere between two and three minutes and I did not touch a formula or cell reference. I reckon with respect to this criteria Quickcalc is watertight.

Copying single cells or text is simple. This is why the modification above was so quick. Nevertheless I would still have halved the time if rows, columns or blocks could have been shifted in one move. The swap needed 10 separate copies, whereas I would have needed only one had this feature been available.

Not finding any obvious way of filing a spreadsheet in Ascii or display format in the excellent little handbook, I began experimenting. I soon gave up when all I achieved was to demonstrate some of the error messages.

This program adopts the principle that text entries are associated with the cells. I find this useful in some respects, such as when used for row or column headings and awkward at others when you wish to add comment lines, footnotes and the like.

My preference is for systems which disassociate the text from the cells where only one method is available, but I would never downgrade software for adopting the cell-based method.

Few things irritate me more than systems which force me to count spaces, therefore I do like Quickcalc's ability to justify the headings.

Reading back through this review, I sincerely hope that I have not given the impression that the package is in anyway unsatisfactory. Nothing could have been further from my intention. I have matched this product against a set of criteria which would break many of the largest, most sophisticated spreadsheets designed to run on IBM PCs with half a megabyte of memory.

The fact that Beebugsoft's spreadsheet can even stand comparison with the ultimate programs is intended to be high praise indeed. I described it the other day as follows: "I started testing a Metro or a Fiesta and discovered it compared very favourably with a Mercedes or Jaguar".

Nice one Beebugsoft.

Program: Quickcalc
Price: £15 (cassette), £18 (disc)
Supplier: Beebugsoft, PO Box 109, High Wycombe, Bucks HP10 8NP. Tel: 049481 6666

BSDOS offers more files – but at a price

By JIM NOTMAN

Business System DOS from Computer Users Club, 69 Hadlow Road, Welling, Kent.

THERE was a time when anyone who was selling a new DFS would tell you how compatible it was with the standard Acorn single density system. Not Business System DOS from Computer Users Club. It has deliberately turned its back on Acorn's DFS to produce something which gets around its deficiencies.

The main limitations of the standard system were that there was a maximum of only 31 files, 7 characters for each filename and an inefficient use of disc space. Disc files had to be placed in one continuous space, sometimes making it impossible to extend a file.

BS DOS has a completely different way of organising the disc and its files. This allows up to 256 files. Filenames can have up to eight characters with a three character extension. This is similar to CP/M, where these extra three characters are necessary to show the system what sort of file it is dealing with.

If the disc is double sided both sides are treated as one continuous side, allowing longer files. One of the biggest advantages in the new system is hardly noticed at all. There is no *COMPACT command because it is not needed. Disc space is allocated much more efficiently, so there is no need for the "Can't extend" error.

Names changed

With just the BS DOS fitted PAGE is at &1700, because it doesn't reserve any private workspace just for itself. This means that even with the standard Acorn DFS fitted PAGE is still at &1900.

There are fewer commands than in the Acorn DFS (see Figure I). Some of the familiar commands have had their names changed, the *LOOK replacing *TYPE and *INPUT rather than *BUILD. The main additions are disc format and verify commands.

First impressions were that the system seemed very slow when filing, and this was confirmed by the benchmarks. All the timings were slower than the slowest Acorn DFS, the 0.90. The only exception to this was in writing a relative file backwards.

There seemed to be an error with the internal pointers, because a file written in reverse order, starting with the last item and working backwards, was not the same as one written from the start. These files were the same for other disc system, why not for the BS DOS?

Organisation of the disc is the same as for Torch's CPN (later versions are known as MCP). So with BS DOS you can make use of files produced by the Z80 in an ordinary BBC Micro or when the Z80 is switched off. However this format is not the same as the Acorn DFS or Acorn's Z80 CP/M system.

Acorn recognised the failings with its standard DFS and produced the ADFS (reviewed in the December 1985 issue of *The Micro User*). The ADFS is a much better system, being even more flexible and double density as well. So apart from Torch owners, it is difficult to see who the BS DOS will appeal to.

```
▷*HELP DOS BS-DOS 2.19
  ACCESS [afsp] (L/S/U)
  COPY [src drv] [dest drv] [afsp]
  DELETE [fsp]
  DRIVE [drv];
  FORMAT [drv] [trks] ([type])
  INPUT [fsp]
  LOOK [fsp]
  RENAME [old fsp] [new fsp]
  USER [user]
  VERIFY [drv]
  WIPE [afsp]
```

*Figure I: The response to *HELP DOS*

	DFS	Acorn 0.90	Acorn 1.20	ADF 1.30	BS DOS
1	OPEN + CLOSE files*1000	4.3	5.1	21.7	*21.1
2a	PRINT 1000 numbers	15.7	6.7	13.3	21.1
2b	PRINT 100 strings	61.0	24.8	46.4	113.0
3a	INPUT 1000 numbers	12.6	5.8	6.2	16.5
3b	INPUT 100 strings	57.1	23.0	23.2	73.3
4	BPUT 1000 bytes	5.0	3.4	8.0	7.5
5	BGET 1000 bytes	3.9	2.5	3.4	5.7
6	Move PTR 1000 places	2.2	2.2	6.8	5.3
7a	Write test relative file	62.9	25.9	48.6	103.7
7b	Read test relative file	58.4	23.5	23.8	77.6
8a	Write relative file backwards	240.3	99.6	69.2	**169.3
8b	Read relative file backwards	99.9	39.2	22.6	119.3

(* opened and closed only 10 times)
(** see text)

Table I: Benchmarks

WE OFFERED THEM A CHALLENGER-THEY GAVE US BACK A CHAMPION

After testing the new 3 in 1 Challenger disc drive system from Opus Supplies, Britain's three leading BBC micro magazines were clearly impressed. After all Challenger is the fastest disc link-up ever with no complicated interface connections, soldering or track cutting. No wonder this remarkable plug-in disc drive, double-density disc interface and super fast 256K RAM disc combination is currently taking the market by storm.

A&B COMPUTING

THE VERDICT

"Opus have got a winner on their hands. If you are looking for a disc upgrade you can't go far wrong by buying a Challenger, even if you already have a single drive this would certainly be a sensible upgrade path. This certainly gets my vote as best buy of the year."

A & B COMPUTING – JANUARY 1986

RAM DISC PERFORMANCE

"Here is the pièce de résistance of the whole system – a 256 K RAM disc. I honestly don't know how Opus can do it for the price.

Using the RAM disc is a real dream with disc based applications. Getting back to the actual performance of Spellcheck II, with the dictionary disc set up in the RAM disc, the result is amazing. When in automatic checking mode the text scrolls past so fast it is difficult to read. To put some figures on the improvement in speed, I checked a document just over 21 K long, which took 5 minutes 56 seconds on floppy and only 1 minute 7 seconds using the RAM disc."

A & B COMPUTING

ACORN USER

THE VERDICT

"At £249.95 inclusive you get the RAM disc, double-sided 40/80 track drive, Opus DDOS plus manuals and leads. Overall very good value for money, particularly if you are looking for a disc upgrade from scratch."

ACORN USER – FEBRUARY 1986

RAM DISC PERFORMANCE

"The big deal comes in the speed. Being a purely electronic device, actions such as reading and writing are performed in fractions of the time a mechanically engineered disc drive takes.

To prove the point, I ran three programs on the RAM disc and the same three on the standard Opus drive with the following results (timings in seconds):

	RAM DISC	NORMAL
1 Save 32 K memory	0.34	13.69
2 BPUT 1 to 1000	1.14	4.71
3 PRINT/1000 strings	4.64	10.17

You don't need me to point out the huge speed increases."

ACORN USER

THE MICRO USER

THE VERDICT

"For the serious user Challenger could make file handling far easier and a good sight faster to use than a standard DFS as well as bringing a permanent end to 'is it 40 or 80 track, single or double density?' problems. In addition all the workspace used by a standard DFS is reclaimed and made available to the user by Challenger."

THE MICRO USER – FEBRUARY 1986

RAM DISC PERFORMANCE

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No. 8 April 1986

NEWSLETTER

Hot line for fishermen

ICELANDIC subscriber Ingiber Oskarsson is casting his net wide, hoping to catch MicroLink members and their friends who are involved in fishy business.

Ingiber works in the fish processing industry, based in Keflavik, and wants to contact other system users with connections in the trade.

His company supplies salted fish to customers in Spain, Portugal and Italy.

This takes care of all the cod that's brought ashore, but it leaves him with plenty of other species on the slab – and he'd like to find markets for them.

Haddock, catfish, halibut – and the exotically-named tusk and redfish – are available, fresh and unsalted, and Ingiber can be contacted on MAG20213.

Ready for your order

HUNDREDS of items of computer hardware, software and peripherals are now within keyboard reach of MicroLink subscribers through OrderLink.

Like a shop that is open 24 hours a day, seven days a week, OrderLink is the convenient way to buy products from some of the biggest names in the industry.

And the list is growing as more major suppliers join this increasing popular electronic mail-order database for computer and communications equipment.

LINK WITH THE ERA OF STEAM

THE British Rail booking service on MicroLink isn't all about high speed Inter City travel. It also caters for those who like to hark back to a more leisurely and stylish era.

Subscribers can turn back the clock by taking their reserved seats on one of a series of steam-hauled excursions running between Marylebone Station and Stratford-upon-Avon on Sundays during the spring and summer months.

These special trains will be pulled by historic steam locomotives such as LNER Pacific locos Flying Scotsman, Sir Nigel Gresley and Sir Lamiel.

The return fare of £35 per passenger includes First Class reserved seat, morning coffee and three-course roast beef luncheon on the outward journey, and afternoon tea complete with scones and clotted cream on the way back.

All the meals are served at your seat by BR waiters and there's also a fully licensed bar available throughout the day.

MicroLink plans to add more special train excursions to its British Rail booking service in the near future.

Guide to all the micro shows

THE most complete list of computer exhibitions held in the UK is now available via MicroLink. As new shows are announced they go straight onto the database – making it the most up-to-the-minute guide there is. Currently there are 37 shows on the list – an all-time record.

Satellite covers weather scene

A DRAMATIC breakthrough on the computer front now allows MicroLink subscribers to discover what the weather holds in store.

Whether they live in Turkey or Torquay, they can tap into the same information from outer space that enables the men from the Met Office to predict sunshine or showers.

The reason for this is WeatherLink, an exclusive new service on MicroLink.

Using an aerial based in Kent, signals from the NOAA9 weather satellite are intercepted and converted into electronic data.

The receiver works on circular polarisation to follow NOAA9 every time it appears on the horizon, faithfully monitoring it until it disappears from view some 15 minutes later.

And the same sequence is followed on average four times a day.

Live pictures produced by the satellite hovering 450 miles overhead – it takes two at a time, one in visible light, the other infra red – clearly show the part of the world from North Africa, through Europe and Great Britain up to Iceland.

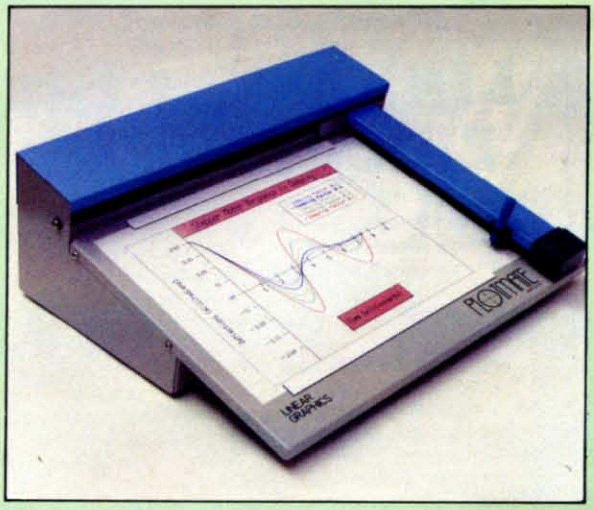
All these are recorded on a micro linked to the receiving aerial. The next stage involves a converter which takes the image and readies it for transmission over standard telephone lines to the main MicroLink computer.

Once a MicroLink subscriber logs on, all he needs to do is pull down the information file in its expanded format, compress it using specially written software which is also on the MicroLink menu, and then display it.

Launched on February 12, WeatherLink generated such excitement that a team from Thames Television was on hand to cover the event.

At exactly 3.05pm, subscriber John Wallbridge achieved a world first by displaying the first weather satellite picture on his micro in his London home.

YOUR chance to join MicroLink – Page 129



Plotting those multi-coloured graphics

The new flatbed plotter from Linear Graphics reviewed by MIKE COOK

PLOTMATE, a flat bed plotter from Linear Graphics, is sturdily built of sheet steel and the drawing area is sloped.

The paper is fixed on with magnetic strips – so you have to keep them away from your discs – and the fibre tipped pens locate firmly in a twist lock holder.

It was supplied with several sheets of expensive paper which is specially coated to prevent ink from soaking in and making the lines fuzzy, thus showing the output at its best.

Basically the Plotmate allows you to get multi-coloured hard copy from your graphics programs in a simple and painless way. It also enables you to use a much higher resolution than the computer screen, so that straight lines will be smooth not stepped.

Let me explain. I arrived home one day with a Plotmate and was immediately harangued by my wife who wanted to know what use it could possibly be.

"It would be useful if it could help me with my embroidery", she said. So in the interests of marital harmony I put the Plotmate through its paces.

In essence, to create an embroidery chart from a picture postcard – you must lay a piece of squared tracing paper over it.

Then each square of the picture is coded with the relevant colour. The trouble is trying to plot this chart on a scale that can be read. So what I decided to do was type into the computer the colours of each picture square and get the Plotmate to print out a chart.

By using the five different coloured pens roughly corresponding to the colours of the final threads and a number of simple symbols, all 17 thread colours could be plotted. Also we would have a very rough idea of what the final embroidery should look like.

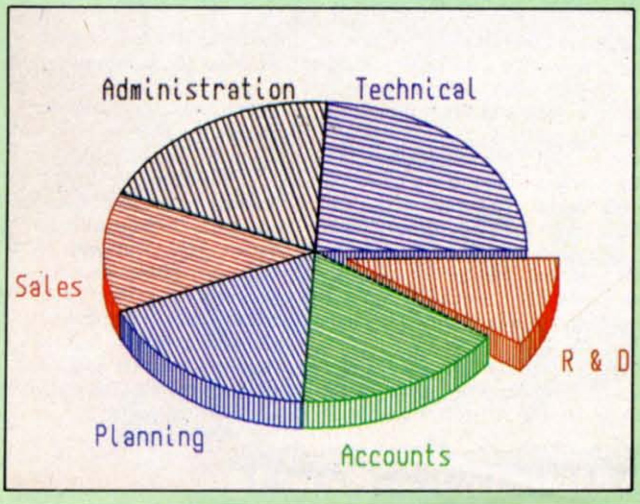
So let's see how I fared. First of all the lead connecting Plotmate to the user port of the computer was very short and I could only just place the plotter next to the computer on the bench. I am assured I was sent the wrong lead.

The instruction manual was brief but to the point, so I ran the demonstration program and selected the instructions option.

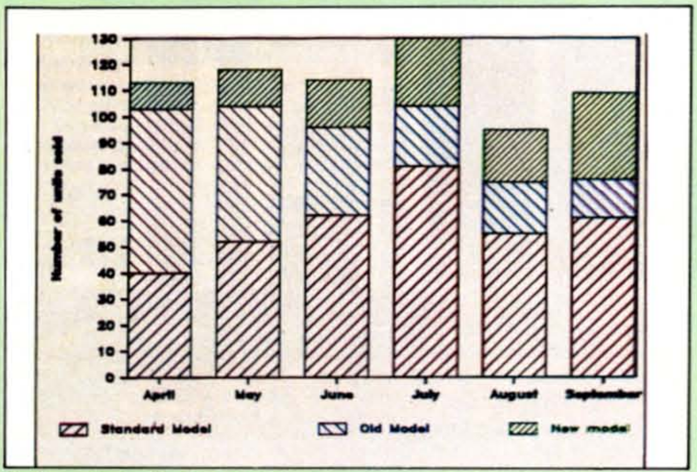
They winked on and then off, the screen giving me no time to read them. I thought I would stab the Escape key the next time round, but found it to be disabled.

Why do people protect software that is of no use to anyone without the hardware? Especially when the software comes free with the hardware. It could have been a useful exercise in how to drive the plotter.

Undaunted, I ran the option which lets you drive the plotter from keyboard commands. Although the pen up and down commands would not always



Departmental budget pie chart produced on the flat bed plotter



Product sales displayed as a bar chart

work the rest behaved as it should plotting graphs, charts and maps.

The idea of Plotmate is that the software intercepts the PLOT commands and translates them into pen movements. This will allow you to first get it right on the screen and then activate the plotter to get your hard copy. Unfortunately the driving software takes up so much space that you can't work in any of the large memory Modes 0, 1 or 2.

There are two versions of the software driver, one that sits from &3400 to &5800 and the other from &5800 to &7000. The former allows a Mode 4 screen to be used and the latter allows more Basic programming space at the price of not being able to use a graphics screen simultaneously.

With a second processor fitted the software is still in the I/O processor allowing more programming space but still the same mode restrictions.

Once your program is running you can activate the Plotmate software by having a program line *RUN the appropriate file, when all drawing commands will be sent to the plotter. Commands to change colour result in a prompt being given to change the pen, and the pen lifting off the paper and moving to one side.

These prompts can be suppressed but not when you are using the second processor. If your plot commands specify a filled area Plotmate will fill it. However, this can take quite some time for large areas.

To save time and obtain special effects you can specify various degrees of shading to fill a block or triangle. The line drawing can also be defined as continuous or various patterns of dots.

As Plotmate enables simple scaling to be performed within the bounds of your A4 paper you can enlarge or reduce any picture to almost any extent. Also the origin may be shifted. Text may be drawn and it can even be given the italic treatment.

There are a few restrictions in techniques when moving a picture on to a plotter. First of all nobody has yet invented a flashing ink. Also the GCOL commands have no purpose except for changing colour.

Once a line is drawn it obviously cannot be erased which means that certain hidden line algorithms do not work – mainly those that start drawing from the back of an object and allow areas to the front to obliterate sections of earlier areas.

So armed with the knowledge gained from these experiments, my wife and I typed in all the embroidery data and with a little deft programming I was able to produce the required chart. It took about 45 minutes to plot.

As it would be totally incomprehensible to most people I will not reproduce it here. However, my wife was more than pleased with it, saying that the computer had finally been useful.

All hardware is only as useful as its driving software, so Plotmate is accompanied by a suite of packages that allow you to exploit it to maximum advantage. While space does not permit a full evaluation, here's a rough idea of their capabilities:

Lincad is a general purpose drawing package with a zoom and editing facility. There is help in the creation of 3D images with arcs of ellipses and the entire drawing can be labelled and saved to disc. The results are prepared on screen and then sent to a matrix printer or Plotmate.

Lintronic is a package especially for the creation of circuit diagrams. Component symbols can be created and used many times. Some symbols such as the loudspeaker require to be constructed from more than one symbol.

Linchart can create bar and pie charts in a number of different ways. The charts are produced either from data typed directly from the keyboard or from an Ascii disc file created by some other program.

Unfortunately all these packages require Basic II to be fitted, a rather unprofessional attitude on the part of the writers of the packages.

To summarise, Plotmate performs well and enables you to create hardcopy coloured graphics of high resolution. I found it a bit noisy in operation when the pen was being lowered – it came down with quite a thump and after a time flattened the fibre-tipped pen, producing a broader line.

Its accuracy was adequate for most applications. When lines failed to meet up it was only by less than the thickness of a line.

However, I felt the software was a little cumbersome in operation and full use was not made of any possible second processor, though I am assured that this is under consideration and will probably have been implemented by the time you read this.

Like most plotters its small fibre tipped pens and coated paper make its running costs not inconsiderable, but nevertheless it is a solid piece of equipment sensibly priced.

Product: Plotmate Plotter
Prices: Plotter £299; Lincad £49.50; Linchart £19.50; Lintronic £19.50.
Supplier: Linear Graphics, 28 Purdeys Industrial Estate, Rochford, Essex. Tel: 0702 541664

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REPLICA III will not work with all programs but neither will anything else and anybody who claims differently is making false claims. Although REPLICA does not appear in any charts over 30,000 REPLICA users cannot be wrong - they have voted with their wallets!

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*SPOOLER - enables you to create spooled files that are compatible with Wordwise, View etc.
*INPUT - is a routine included on the disc which will allow you to write your own utilities for accessing your data. Many of the programs on the utilities disc were written using this procedure

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*EDIT is a FULL SCREEN EDITOR, which means that you can scroll your program up and down just like WORDWISE does with text, do not confuse this powerful editor with the line editor used in other toolkit ROMs. The EDITOR allows insertion and deletion of lines and insert and overwrite within a line. This is the editor that the BBC micro should have had.

*ERROR ON will trap errors in a program and enter the EDITOR at the statement generating the error, no more wading through multi statement lines trying to identify the error.

Commands pioneered by BROM are:
*ROMON & ROMOFF which enable you to turn on/off sideways ROMs so that they stay off even after CTRL/BREAK. This also allows the DFS to be swtiched off and PAGE reverts to &E00 automatically.
*CASE which forces input into upper or lower case irrespective of caps/shift lock.
*FLIST which lists a program one statement to a line but more importantly it will even list 'BAD PROGRAMS'.
*ONEKEY is a single key entry option but you can also define your own strings to any ASCII key, just like an extra 48 function keys.
*FIND, *CHANGE & *SCHANGE provide selective or global SEARCH and REPLACE facilities. These commands work with strings and keywords or a mixture of both e.g. *FIND PROChelp T', will list the full line containing PROChelp, the 'T' simply tokenizes any keywords.

Yet another group of commands allow lines to be moved or copied to a new location.
The other commands provide function key editor, 'BAD PROGRAM' cure, variable lister, integer variable flush, program compacter etc.
This is a genuine useful ROM that no user should be without. Be warned, once used you will not be able to live without it!
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